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Foundations of School Learning

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Foundations of School Learning

BY *Harry Grove Wheat*

WEST VIRGINIA UNIVERSITY

Alfred A. Knopf NEW YORK 1955

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FIRST EDITION

PREFACE

MANY CHANGES TAKE PLACE IN PERSONS AS THEY DEVELOP from birth to maturity and many conditions surround them which either promote or retard their development. The manner of the changes and the nature of the conditions are matters which provoke widespread speculation. Students of human growth and development have given these changes and conditions their special attention, and have evolved interesting explanations and descriptions. These they have organized into systems which suggest certain principles that serve as guides in stimulating and managing development.

The development of the person is many-sided. He develops physically, mentally, socially, and in general behavior and attitude. Each side is a phase of the others, yet each may get out of line with the others. The importance of balance is apparent. The forces that condition development are continuous and ever-present. Development is not a process that confines to any single place or time.

Yet in the life of the individual in modern society there is a place and there is a time which society sets apart for the special stimulation and guidance of development. The place is the school and the time extends through the years of schooling. The school and the nature of its work are so important in the life span that they require special studies of their own.

To promote the developmental work of the school, thousands of students are in constant preparation. These future teachers need the discipline of the study of all phases and conditions of development. They need in a very special way, certainly near the start of their training, the discipline of a study which centers upon the positive program of developing pupils that the learning situations of the school can provide.

The present volume seeks to supply the latter need. It is a book for students who are preparing themselves for teaching. It draws its illustrations from the activities of teachers and pupils. It requires its readers at times to extend their earlier experiences in the school and to imagine the learning activities of pupils as the teacher may see them. It describes the behavior of children and youth whom the instruction of the school has turned into pupils and thereby supplies a special treatment of development which does not need to be a narrow treatment.

The present volume seeks to present its lessons to students directly. There are no quotations, footnotes, and reference lists. The book assumes an instructor who will supply the ones he wishes his students to consider. This omission also avoids the distractions which such devices very commonly turn out to be.

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Part I Educational Aims

Chapter 1

The Function of the School

Purpose of the chapter. The work of the public school, through the twelve years of its program, moves ahead along four parallel lines: (1) the use of language, (2) methods of exact thinking, (3) a broad view of the world, and (4) care of individual needs. These lines of progress interconnect at many points, providing paths of relationship as well as avenues of forward movement for the activities of learning. They are designed to move the pupil from his state of immaturity and dependence upon others for his ideas toward one of maturity and intellectual self-dependence. They are laid out to prepare the pupil to meet intelligently the responsibilities of adulthood and citizenship.

The chapter will consider the four avenues of approach to responsible maturity and show how they fit the pattern of American life.

The school centers its lessons in the language arts. Language activities are the central activities of the school. At the age of six the child goes to school. At this age he has acquired a sufficient mastery of his mother tongue to take his place in the social group of the school. He can now understand the directions his teacher will give him for his guidance. In school, the teacher guides him in the activities that lead to a working mastery of the arts of reading and writing by the end of the primary grades. From the beginning of the intermediate grades until he leaves high school, he must deal with an ever-increasing number of books. By means of language—reading, and oral and written discussion—he gains an introduction to the content subjects of history, geography, elementary science, hygiene, and literature. Forms of language guide his progress in the industrial arts, in music, and in graphic art. In arithmetic, algebra, and geometry, he learns some bits at least of the language of precision, of general laws of combination, and of proof. Language is the core of the curriculum. The pupil who masters the language arts is prepared to attack with success most of the tasks his school sets for him. Conversely, the later failures and maladjustments of many pupils trace back to initial failures to master the language arts. Progress in the later years of schooling depends in large part upon appropriate instruction in language in the earlier years.

Language is commonly defined as the expression of thought in accordance with conventional standards of form. Thus considered, language is the product of thought, the aftermath of thought, and a useful means of arousing thought in others. But language is more than a means of expressing thought; it is the means by which thought is made possible. Later chapters will show how words pin down our ideas, particularize them, and make them available for further thinking. Our concern here is the fact that lessons in language—in the combining of words for the relating of ideas—train the pupil to think for himself.

Thinking for oneself, or at least getting the materials to make possible thinking for oneself, has always been the basic purpose of the American school. The Massachusetts Law of 1647 required the establishment of schools to teach pupils to read the Bible, which was their only literature, so that each person would be freed from dependence upon others for the interpretations he would make his own. The principle of learning self-dependence crowned the structure of American education from its beginnings. American schools began as reading schools; they continue to this day, in theory if not always in best practice, as reading schools. In many schools, reading is no narrow program, but a rapidly expanding one. The pupils learn to read silently as well as orally, fluently as well as analytically, and to do all with purpose and appreciation; they broaden their experience through reading; they lay the foundation of a liberal education through reading. They learn also to tie in their reading with oral and written discussion, and thereby to bring the results of their reading into organized unities which lead to interpretations and conclusions. Language is the first corner post of American education.

The school seeks to teach methods of exact thinking. Arithmetic, the art of number thinking, had its place beside reading and writing in our early schools. It was then, and has too long remained, a narrow and often frustrating subject. Yet in many schools, though in all too few, arithmetic has become one of the chief means of teaching self-reliance and independent thinking. It gives a picture of the simplest and most logically related system of exact thinking devised by man. It gives a means of understanding the infinitely numerous in the complex world of modern society and the infinitely small in the world of science. Its proper study gives an understanding of the quantities of things—goods, dollars, persons—which, in turn, gives an understanding of the qualities and meanings of issues confronting the citizen.

In the later years of the school, algebra and geometry maintain a strong foothold. They present their central lessons freed from the distractions of much interesting content. Algebra gives, through the medium of the formula, an exact method of procedure from particular facts to their simple statement as general laws. Geometry gives an exact method of procedure from the statement of a proposition to its logical proof. In the entire program of the school, the subject of science holds an important position. The courses in science in the earlier years stress the content immature pupils are able to grasp. The courses in the later years help the more mature pupils to gain a view of the organization and methods of science.

The methods of thinking the pupil learns in school may become his most valuable possessions. They are the intellectual tools which earlier generations have invented and perfected and which they pass down to him. The world of earlier peoples, though not so complex socially and politically as our own, nevertheless gave them experiences which were confusing in their abundance. Over the long sweep of the centuries, early peoples came to observe some of the qualities of their experiences, to compare and differentiate them, to bring them into some order and relationship, and to distinguish causes and results. They passed along to their successors their findings and their methods of observation. In the course of time, these methods were improved and brought together into consistent systems. As well-ordered systems of thinking, they have come into American life and have made their contributions to its development. It is a major purpose of the school, and one of its chief responsibilities, to transmit these methods of exact thinking to the children in its care.

The school enlarges the pupil's view of the world. In the early nineteenth century, the school added geography and history to its curriculum. The purpose was to extend the experiences of pupils from the here and the now to other lands and times, to broaden their view of the world in which they live. In many schools these studies have been expanded and enriched and organized into understandable sequences. Much of the reading and discussion activity of the elementary school deals with the industries, the conditions of living, the customs, and the human relations of peoples and societies of other times and places. The instruction of the secondary school deals with community, state, nation, and world affairs, what they are and how they have come to be. The school as a whole teaches lessons in citizenship and prepares its pupils to sense the problems of citizenship. A broad view of the world is an important corner post of the curriculum.

Geography and history commonly are classified as "content" subjects, which some teachers interpret as those providing information that should be interesting and, perhaps at some time, useful. So interpreted, the subjects seem to have no requirement other than that the pupil gain and retain the information they hold out for him. Actually, the subjects are much more than containers of information, for their proper learning stimulates the imagination, gives insights, and leaves important ideas and attitudes and points of view long after the information which provided them has faded in the memory.

When the beginning pupil seeks and gains entertainment in the simple stories of Indian life and pioneer life that he can understand, he may learn to give some special attention to such matters as food supply, clothing, and shelter, and perhaps communication and transportation. These matters may become, through later emphasis and development, centers of classification for the expanding information with which the pupil must deal. Still later, they may become classifying ideas in his study of problems of modern community and national life. The problem of housing, for example, is more than a vague phrase or a matter of personal difficulty to the adult who as a pupil learned to give attention to "shelter" as a classifying idea for his study of peoples of other places and times.

The study of his own country gives the pupil of the American school training in shaping some of the important ideas the intelligent citizen possesses. As he learns about America and the life and opportunities for living it has fostered, he develops his regard for American life. As he learns about the difficulties of his predecessors in establishing their homes and building their communities, and defending them and their country, he gets a view of the ways they pursued to resolve their difficulties, ways that sometimes are good starting points in considering present-day problems. Just as the history of an art gives a view of the nature of the art and of the difficulties encountered in developing it, so does the history of America give a view of what America means and the responsibilities of those who would support it. As the pupil learns of the price his predecessors paid for the rights and privileges he enjoys, he may gain in his understanding of the value of these rights and privileges and of his personal obligation to defend and perpetuate them. His study of history may give him some small view of the ideas that stimulated the deeds of those men and women who made history. He may catch a glimpse of the motives of those who founded his country and established its basic laws. He may sense something of the forces that made his country great. He may make a beginning in learning the lesson that human betterment in national life and in the lives of individuals is ever an achievement, not a gift.

The school seeks to care for individual needs. We have been giving attention to what we may call three corner posts of the curriculum of the American school: the use of language, methods of exact thinking, and a broad view of the world. There is a fourth corner post. This we may call care of individual needs. Increased enrollments, especially in the high school, beginning in the early years of the century, have pointed up the diversity of interests, aptitudes, and attainments that exists among the members of the school's population. We have responded by providing new offerings, some advanced and some elementary, to give employment to special abilities and to alleviate special disabilities. These were no window-dressing offerings, at least not in our earlier intention. They were, instead, offerings which would serve to round out the program of general education and give it a special applicability to individual pupils.

The complexities of modern life and its impacts upon the individual have brought about the need for subjects in school that would teach all pupils how to care for their individual needs. Crowded school buses as well as crowded streets suggest the need for *safety education*. The compulsion that removes children from the care of the home to the care of the school imposes the responsibility for *health and physical education*. The diminution of household chores almost to the vanishing point requires new forms of training in *manual arts* and in *household economics*. The rapid shortening of the working day and the increasing opportunities for leisure raise the aesthetic appreciations of *music* and *art* and *literature* to higher levels of importance. Two-fifths of the population of high school age are still not enrolled in the high school, and an appreciable number of the three-fifths who do enroll must leave school before graduation in order to contribute to family support. For the latter, elementary *commercial* and *industrial training* must provide for immediate needs. In a world of growing complexities the individual is in need of ever-larger amounts of the protection and care the school can provide while he is learning how to protect and care for himself. Care of individual needs is the fourth corner post of the curriculum.

The work of the school provides intellectual training. Our description of the work of the school along the four lines of the use of language, methods of exact thinking, a broad view of the world, and care of individual needs is a kind of still picture of its external features—sameness of course outlines, sameness of lesson plans and procedures, sameness of objectives. We need to take a deeper look to get a view of the ever-changing learning activities of pupils. We need to move into the school to discover that the apparently repeated lesson of today may be a quite different learning performance from that of yesterday's lesson. We need to consider the work of the school in terms of the developing responses of pupils.

When we overlook, or otherwise disregard, the learning activities of pupils, we get a view of the subjects they study that is both inadequate and misleading. We seem to see the subjects as somewhat sterile and lifeless forms which stand apart from the interests and needs of pupils and which have little value in themselves. There are many teachers and professional educationalists who speak of the school subjects in apologetic terms and credit them with value only as "subject-matter tools" and "subject skills" which the pupil may use or ignore as he may wish. Their narrow view leads in many schools to carelessly made and short-lived substitutions for the sequential social arts, the systematic modes of thinking, and the organized bodies of information which racial experience and many generations of teachers have perfected as the birthright of pupils.

In a sense, the subjects we teach pupils in school are tools, which they learn to use with varying degrees of skill. In each subject are parts which have much use and parts which have little, if any, use. Determining values in terms of usefulness, we tend to search out the useful parts and give them the emphasis in our teaching; we seek to save the time and energy of pupils by protecting them from learning things that are useless. In so doing, we overlook and neglect to teach elements which make the useful parts useful.

To gain the usage of some useful part of a subject, the pupil must become intelligent about its possibilities for usefulness. This insight must not be confined to the part itself, but must extend to all other parts of the subject with which it relates and which give it its value in meaning and understanding. The internal relationship, or thread of continuity, through all parts of a subject give a useful part its usefulness or, in common parlance, provide the know how.

In a larger sense, the subjects of the school are more than tools which the pupil may pick up and use and lay aside. As he learns them, they become parts of his life, of his ways of thinking, of his attitudes, of his methods of responding to situations. As he learns to read, for example, he learns to resolve all his problems in terms of written language. He gets a new view of things, a new way of looking at them. Reading becomes, like the hand and arm to his body, part of his intelligent being, and impossible of dissociation without a consequent distortion of his manner of life. As such, reading is not something apart from him, but the pupil himself acting in a new way in a new world his reading has opened to him. We may properly speak, of course, of the pupil's developing skill in some phase of his exercises in learning reading—for example, in recognizing words. Yet his development of skill in recognizing words depends upon his development of consciousness of the distinguishing features of the words. He must learn also to recognize the meanings the words carry as these meanings combine in the contexts of phrases, sentences, and paragraphs.

Similarly, the pupil's work in other subjects is primarily practice in thinking that leads to intellectual power. He thinks his way from a number question to its dependent answer and learns to distinguish number questions in the situations of his life. He studies the steps of valid proof and learns to note the hidden flaws in misleading argument. He notes the factors of progress and of deterioration in past happenings and gains some ability to recognize them in current events. He considers human aspirations as his literature and biographical readings picture them, and sometimes gathers the inspiration to reach beyond his grasp. The resulting training of his proper school work is intellectual.

The work of the school is systematic and planned. Progress along the roads of learning the school provides—the use of language, methods of exact thinking, a broad view of the world, and care of individual needs—is of necessity a forward movement. Moving back and forth along and across the roads and touching them at scattered points here and there do not produce the sequence and the momentum of steady travel to a goal. Substantial learning is in steps, each leading and carrying forward to the next. The characteristic of on-going continuity, or internal relationship, in the subjects of learning, which we have mentioned earlier as the giver of value to the scenery along the way, provides the angle of vision from which each bit may be properly viewed.

To gain success in the later stages of his work in any subject, the pupil must first gain success in the earlier stages. He must learn to recognize the forms of printed words and the meanings they carry in order to become a fluent reader; and he must be able to read ordinary story materials with some ease before he can profit from lessons in analytical study and in the appreciational reading of literature. He must learn the divisions of things into tenths and tenths of tenths before he can study with success per cents and their practical applications. He must learn to recognize the facts and features which maps represent to be able to move ahead in geography and history. He must extend his experiences in every field as a preliminary to the exercises of organizing his experiences.

Our illustrations do not suggest that the pupil must gain perfection in the earlier stages of his learning before he can proceed to succeeding stages, or that he may not improve his earlier learning through later use. He may improve his ability to read through his reading of history and biography, for example, but he must first have made a good beginning in his reading. He may extend his understanding of dividing by relating the areas of states with their populations in geography, but he must first have learned much of the meaning of dividing amounts into equal groups and equal parts. He does not start his activities in reading or in number thinking as outgrowing necessities of his studies in history and geography, respectively. In every field of his work, the pupil progresses from step to step in ordered sequence.

The school is not the only agency of society that provides education for children and youth, but it is a unique agency. Other agencies, such as the home, teach valuable lessons which cannot be learned properly or in equal effect elsewhere. But the other agencies must teach their lessons in incidental ways and as incidents of activities which are of primal concern. To illustrate, the home must first and always provide its self-support and self-perpetuation, and must make the education it gives, and all its other benefits, however important, secondary and succeeding concerns. In the case of the school, however, the situation is a different one. The school need not concern itself with its support, because society as a whole provides its maintenance. As a consequence, it can make education its first and only concern. It has no other activities of major importance that put the education it is designed to provide in a secondary and incidental role. The school can organize its lessons as matters of importance in their own right and teach them in planned and systematic ways. The school is a unique agency of education, having a special function and responsibility.

Yet the school does not enjoy the advantage of universal recognition of its unique features as an agency of education. Many friends of the school seek to minimize its special function. There is a growing body of argument to the effect that much of the education of the school should be incidental. A considerable number of school workers advance the theory that the school should provide activities that are copies of activities found outside the school—playing store, constructing miniature houses, and pretending self-government by playing the parts of citizens and elected officers in a classroom community. They suggest that the school should take its pupils on trips to the farm, to the dairy, to the factory, to the store, to the shop, to the church, and to the various types of homes. They want the school to use these activities as controls of interest and as points of departure for lessons that are inherent but incidental. They advocate that the school should not seek to withdraw pupils from the distractions of the outside world, but should seek to reproduce out-of-school activities for the sake of the lessons they can incidentally teach.

Advocates of the theory of incidental lessons do not appear to consider that the real activities of the outside world are capable of teaching more impressive lessons than can any second-hand copies the school can make. They seem to forget the reason for the school's existence and for its support by other social agencies—namely, that the impressive lessons the outside world may teach are neither sufficiently impressive nor adequate. Perhaps they should remind themselves that the school is society's special educational agency, which society supports to perform the special tasks of education that society deems of such special importance in their own right that they cannot properly be made the mere incidents of other activities. School education in its very nature transcends the incidental. Incidental education provided within the school is not merely a poor substitute for its prototype of the outside world; it is not school education.

Yet we should not deny incidental learning its place in the school. Frequent occasions arise within the school for the teaching of important incidental lessons. The good teacher is ever alert to teach any good lesson the incidents of the school day set forth and make prominent. But to do all this, the school need not neglect its main function, which is to put education first and to shape it into its ordered and understandable sequences. It is not the established function of the school to expend its energy in providing opportunities to teach incidental lessons. The lessons the school can teach and has the obligation to teach are so important that they should not be left to chance.

To the trained adult it seems easy to see in the incidents of everyday experiences the arts, skills, contents, and modes of thinking the school should teach; and, in contrast, it seems difficult to organize the lessons of the school in the sequential steps of systematic learning. But for the untrained pupil it is not easy to grasp the lessons which everyday experiences seem to us to contain, for the experiences take the attention and hide their lessons under their surfaces. The untrained pupil does not easily grasp relations and applications, even when he has gained the constituent materials. For the sake of the lessons he should learn, there is no substitute for the advantages of earlier lessons that connect in a chain of sequence.

The learning of the school belongs to all children and youth. The American public school as we know it today is a comparatively recent development. It began as a local enterprise in scattered communities in colonial and pioneer days, with short terms and a narrow curriculum. It expanded its program in privately supported academies that were opened to the privileged few. It became, finally, following the establishment of the Union, the free common school for all the children of all the people.

The common school for all children was long an idea before it became an established fact. It followed slowly in the wake of settlement as the frontier moved westward. Its terms were short and its course lasted only until its pupils were old enough to be employed in the work of the home, farm, or factory. Today, its term has lengthened to eight to ten months a year, and its course has extended to a program of twelve years. In recent years, it has expanded its services, and has claimed an increasing measure of public support. During the first half of the present century, while the total population of the United States was increasing 100 per cent and the number of people between the ages of five and seventeen was increasing 50 per cent, the average attendance of pupils in public schools increased 100 per cent, and the total annual expenditures for the support of public schools increased 2,000 per cent—from $215 million in the former years to some $4,500 million in the latter. The public school is the object of interest and support by our American society. Members of the adult generation, whether they enjoyed the privileges of schooling in their earlier years or were denied them, are conscious of its benefits. For their children, they desire such benefits as they enjoyed, or greater benefits than they themselves were privileged to enjoy. For their children, they have provided the means for the transmission of the education of the American heritage.

Yet laying out the roads of learning of the school for all pupils and seeing that all pupils travel the roads are two different things. In the case of at least three of the four highways of learning we have discussed, very effective road blocks—or perhaps, inviting detours—confront pupils in many schools and halt their progress. Many teachers and ever-larger proportions of professional educationalists not only have become apologetic about the school subjects, but also have largely abandoned the central themes of the subjects which give them their meaningful coherences. For the subjects that group under the use of language, methods of exact thinking, and a broad view of the world, there are various substitutions or, perhaps more exactly, somewhat similar substitutions under different titles: "life adjustment," "common learnings," "areas of experience," "core curriculum," "units of activity." In some instances, there no longer exists a pretense of teaching the subjects, even in the incidental ways to which our preceding topic has referred. "We do not teach subjects," say some teachers. "We teach children." *What* they teach the children is nebulous in the extreme.

Perhaps the large majority of our teachers keep trying to the best of their knowledge and ability to promote the learning of the organized subjects of the school. Perhaps there are still a few theorists who recall the results of the investigations into the nature of the subjects by their predecessors, who recall, for example, the way the laboratory studies of reading of a generation ago revolutionized the teaching of primary reading in the schools. Yet all too many teachers and theorists are exerting their influence, no doubt with good intentions, to bring the learning of the school subjects into disrepute. Of such learning, they speak in derisive terms. It is "traditional"; it is "disciplinary"; it is "formal." Indeed, they speak truly, though without true meanings. The learning of the American heritage is all they say: traditional, for it offers to children and youth the distilled lessons of racial experience; disciplinary, for it provides training in effective modes of thinking; formal, for it emphasizes the ordered sequences of causes and results. The critics of the learning of the school subjects say also that it is "undemocratic." In this, they make their greatest error.

The work of the school fits the pattern of American life. In America, the citizen is the sovereign. "We, the people" are the first words of its basic law. The powers of government reside in the citizen, and they do not rise in justice above his intelligence. "Governments," says the Declaration of Independence, "derive their just powers from the consent of the governed." The word *consent* in the Declaration means no complaisant agreement or easy adjustment with things as they are, but rather a "consensus" of knowledge, a judgment of values, and an intent to stand by what one stands for. The foundation of the citizen's consent is education. Such was the belief of the founding fathers of our country.

> Promote then, as an object of primary importance, institutions for the general diffusion of knowledge. In proportion as the structure of a government gives force to public opinion; it is essential that public opinion should be enlightened.
>
> (GEORGE WASHINGTON)

> If a nation expects to be ignorant and free in a state of civilization, it expects what never was and never will be. . . . There is no safe deposit [for the functions of government] but with the people themselves; nor can they be safe with them without information.
>
> (THOMAS JEFFERSON)

> A popular government without popular information or the means of acquiring it is but a prologue to a farce or a tragedy, or perhaps both. Knowledge must forever govern ignorance; and a people who mean to be their own governors must arm themselves with the power which knowledge gives.
>
> (JAMES MADISON)

> Piety and virtue are generally the offspring of an enlightened understanding.
>
> (GOVERNOR CLINTON)

> Religion, morality, and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall be forever encouraged.
>
> (CONGRESS, IN ITS ORDINANCE OF 1787)

Our forebears had faith in education. They established schools so that "learning might not be buried in the graves of their fathers." To them, the school was a means of "keeping alight the lamp of learning" and of "transmitting civilization" to the young. They finally, in the course of time, opened the school to all the children of all the people, overcoming in their faith the determined opposition of those who doubted the possibilities of universal education.

In our own day, the apostles of doubt are in the ranks of those who have assumed the responsibility of transmitting civilization to the young. It is a strange and startling anomaly that professional educationalists repeat the argument of the enemies of free public education of a century and a half ago—namely, the argument that large numbers cannot profit from the education of the American heritage. There is, to be sure, a bit of difference in the arguments. Then, it was the "children of the ill-favored" who could not profit; now, it is "the ill-favored children."

The reason is not far to seek. The educationalists have lost their faith in the capabilities of American children and youth. They say that millions, who will be the voting citizens of tomorrow, are unable to profit from American education as it has come to our care. One of their number has said sixty per cent cannot profit from traditional education. Some say a half, or a fourth, or a third. Some make the fact of individual differences the argument for divergence from the American educational program as it is, and then adopt the single program of life adjustment for all. They forget that the most impressive fact in every study of individual differences is the fact of individual similarities. They do not recall that "the race is not always to the swift or the battle to the strong"; and that each with all must assume the role of the sovereign citizen, whatever his preparation to meet the responsibilities of citizenship.

The founders of the republic and the champions of universal education of the early nineteenth century entertained no such ideas in their efforts to extend the benefits of education. The education which the privileged few had enjoyed was the education they wished to extend to all, not a different and emasculated brand. No educational leader of their times ever suggested a "college preparatory" curriculum for the "intellectually superior" and a "life adjustment" or "vocationally slanted" curriculum for the "slow learners." In the view of all such patriots, education trained the intelligence of every pupil, whatever were his potentialities, and helped to prepare him intellectually for the duties and responsibilities of citizenship. "The education here intended," said John Adams, "is not merely that of the children of the rich and noble, but of every rank and class of people, down to the lowest and the poorest." If he and his compatriots recognized the existence of class distinctions among the population, they had no intention of founding an educational program that would perpetuate and foster them.

Summary. The curriculum of the school includes the difficult tasks of education which other agencies cannot perform as incidents of activities that are of basic concern to their support and survival. These tasks require the service of a special educational agency that can make the work of education its central interest and single function. The school is this special agency. Society supports it to perform the difficult tasks of education.

Out of school, the child may learn his mother tongue; he goes to school to learn how to read. Out of school, the child may learn rote counting; he goes to school to learn the number system. Out of school, the child may learn the uses of simple measures—the foot, the pound, the gallon; he goes to school to receive instruction in the meaning of measurement and in the relations between measures. Out of school, the child may gain direct experiences; he goes to school to learn how to organize experiences. Out of school, the child may view the world immediately surrounding him; he goes to school to acquire the devices for gaining a broader view. The difficult tasks of education are the special responsibilities of the school.

All this does not suggest that the school should try to take over in any degree the function of other institutions for social preservation and social betterment. The school must not neglect its special and distinctive function of education. Society indeed maintains the school for the contribution it may make to social advancement, but society plans that the contribution shall be indirect. The school cannot make itself a director of other social agencies and remain the school. Its function is service, educational service, to individuals who may thereby gain the preparation to contribute to social advancement.

The social order of a republic can advance only in the degree that the individuals who compose it are intellectually able to sense and to solve the social problems that confront them from day to day. No one can anticipate the problems in the sense of prophesying what they will be. Yet persons can prepare to grasp and to attack problems as they meet them. Working through the various social agencies, prepared individuals render the service of social betterment that society needs for its advancement.

A truly representative government presupposes that its citizens shall have intellectual independence. Its stability and advancement rest upon the intellectual alertness of its citizens. In order to guarantee its self-perpetuation it sends its youth to school to gain these and other qualities of good citizenship. To the extent that the school sticks to its single function of education, it may prepare its pupils to meet their responsibilities as citizens of the republic. By serving the individuals who must fill the ranks of the social order, the school serves the society that supports it.

Chapter 2

Untrained versus Trained Responses

Purpose of the chapter. The present volume is a treatment of the explanations of human behavior in the learning situations of the school. The school is a unique educational agency which society maintains to set up and direct learning situations of a special type. The present chapter describes the responses pupils may make to the learning situations the school provides. It suggests that learning moves the pupil from the status of an untrained, immature individual to that of a person of trained maturity.

The purpose of the school is to provide the situations for learning. As we look at the school from various angles, we see it differently. From one angle, we see the school as life in miniature and its work as an extension of activities on the outside. From another, we see it as an agency for the cultivation of interests which the outside world does not foster. We also see the purpose of the school from different angles. From one angle, the school should copy the incidental lessons that the situations of everyday life outside the school suggest and provide. From another, it should avoid the distractions of outside everyday activities and direct the attention of its pupils to activities that are different from them in nature and value. Somewhere between these two extremes is the purpose which society has set for the school.

When we see the school as a unique educational agency which society maintains to perform the tasks of education too difficult to be learned as incidental lessons of everyday life, we discern a special function. We may say that the special function of the school is to provide situations which stimulate learning. Other agencies of society provide situations that stimulate learning, but they provide them in incidental and fortuitous ways. In consequence, they neglect many important lessons. There are valuable intellectual devices which the individual does not easily pick up while he expends his energy as a cooperating individual in society at large. The school, then, has a unique responsibility. Its special task is to provide learning situations as centers of interest that are important in their own right alone.

The pupil's learning results from his responses. The mind or mentality of a person is something more than a mere storehouse of mental images and of memories of things and experiences. It is something different from a special faculty having a location of its own somewhere in the physical organism, or an operating mechanism that is separate from the individual's other functions. It seems rather to include, or to be, the individual's active organized personality that responds to the excitations of the world around it and in it. It is, in a way, the totality of the responses themselves which through the years has grown and developed. Thus, we may say, a given situation has given an experience; another situation has given another experience. These experiences, which are ways of responding and reacting, and attitudes and feelings, constitute the mentality of a person and give him his mental life. Through the years, he has accumulated and expanded experiences. Thus he has grown as a person. Through the years, he has shaped them into new organizations so that they have acquired new complexions. Thus he has developed as a sentient being.

The ideas of mental growth and mental development suggest that no given situation, at least the part coming from without, in and of itself can guarantee a given experience. The situation provides a stimulus, but the response results not alone from the stimulus. The person's attitude, his mental growth, and his mental development are factors of the total stimulation. No situation then is a force that operates by itself alone. A situation operates as nothing more than a contributing stimulus to the resulting response. The course of a boat across a stream, for example, comes only in part from the thrust of the oars. The flow of the stream, its main current and its crosscurrents, is a matter of concern to the oarsman. Similarly, the currents of a person's thoughts, often the confusing crosscurrents, are as much the determiners of his manner of response to a given situation as is the situation itself.

The type of personality touched by a situation, rather than the mere presence of a situation, is, then, the thing that counts. The way the person responds is the experience gained and the element of value. The experience is both the situation and the person in it. His reaction, its externally objective and internally subjective phases, is the experience.

The situation the teacher sets up as a learning situation is actually a learning situation only to the degree that it is a learning experience for the pupil. To illustrate, two pupils may be in what appears to be the same learning situation and have two quite different experiences. The external conditions are the same, but the pupils' reactions differ. What is significant is not the objective situation the teacher sets up in the school, but the inner reactions, feelings, and attitudes of the pupils. What is learned by each is a result of the way he responds. The surrounding situation is important as a factor that contributes to his responses.

Untrained responses are different from trained responses. We may observe two pupils in the same class in arithmetic having two different kinds of experience. The teacher may be introducing the topic of percentage and providing for all what seems to be the same situation of learning. But if one pupil is good in arithmetic and the other poor, if one has an understanding of the operations of the number system with whole numbers and fractions and the other is a mere routine worker in these operations, their resulting learning experiences are actually not the same. Apparently, the two pupils have the same instruction at the same time by the same teacher. Actually, the teacher's introductory remarks do not constitute the same situation for the two pupils, but two very different situations.

We may observe a teacher introducing and recommending a new book that appeals to the interests of two pupils who are in the same reading group. It would seem that both would respond with equal enthusiasm when they could get the book to read. Yet if one is a slow and laborious reader and the other can read easily and rapidly, the actual reading situation is not the same for both.

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We may make similar observations in every grade and in every subject throughout the school. The situation of writing a composition about the basketball game is not the same for the pupil who is a labored writer as it is for the pupil who has learned to organize his ideas in sequential form and write them with ease. The same selection on the piano is not the same when the unpracticed pupil plays it as it is when played by one who has mastered the art. A poem is often not poetry when the poor reader attempts it, but it is a source of satisfaction to the pupil who has learned to read poems. The same laboratory exercise is in one case a time-killing routine, and in another an intellectual adventure.

How the person has been trained to respond makes the difference in the experience. The dub at golf or tennis wonders how the good player can get so much pleasure from the game. He does not understand until through training he develops his performance to the point where he can get the thrill that comes from successful effort. Differences in the amount and quality of the trained responses of different individuals account for differences in inner experience, though the situation which provides the experience is outwardly apparently the same.

Training gives new views of things, new attitudes, new ways of responding. Training colors the external world in new and different hues, and brings to view things and qualities never otherwise seen. It thus enlarges the environment, and provides the stimulation for new experiences. It also provides preparation in advance for new experiences.

Education is the difference between an untrained and a trained intelligence. Education is more than cleverness or cunning, sagacity or sharpness of wit. It includes at its base emotional adjustment, an unselfish attitude, regard for the right, and a standard for conduct. Without its "feeling" qualities, education is very narrow indeed. It would be inappropriate to think of education without its feeling qualities.

On the other hand, it would be quite as inappropriate to consider education as the composite of the necessary feeling qualities, but with intelligence omitted. Intelligence is basic to the feeling qualities, the force that moves them and that gives them direction—indeed, it is the very warp and woof of their structure. A person feels according to the things he knows, according to the ways his experiences have trained him.

The school contributes to education, the composite of feelings and intelligence, by training intelligence. The pupil comes to school at the age of six with the physical equipment for mental activity with which heredity has endowed him, and with the training his home and his world of childhood experiences have given. The school undertakes to add to his training the intellectual tools that will make his mental activity effective. The school provides him with written language, with methods of exact thinking, with a broad view of the world, and with special guidance for his individual needs and aptitudes. These tools he can carry back into the world, when he leaves the school, as means of interpreting the activities of the world and the part he may play in them. These tools are contributions to the growth and development of his intelligence as they are at the same time contributions to his education. These gains to his intelligence are his education. His education is the difference between an untrained intelligence and a trained intelligence.

Intelligence results from intellectual growth and development. The intelligence of a person is at once his accumulated inner experiences and their pattern of relationship. Any new experience—that is, any new meaning, attitude, point of view, or way of responding—is a contribution. He is thereby just so much more intelligent; he acts henceforth just so much more intelligently. Moreover, any new relationship he develops among the experiences he has gained is a change of pattern, a change in level of experiences possessed, and, as a result, an enlargement of or a difference in mental functioning. The person is therefore not just so much more intelligent in the mental world in which he has been living. He becomes intelligent in a changed and changing mental world. Thus the training of intelligence imposes two requirements —namely, (1) the enlargement of experiences, and (2) the organization of experiences.

The school aids its pupils in utilizing experiences. The school serves not alone to broaden the experiences of its pupils. It seeks to aid its pupils in bringing their experiences into order and relationship. This is its major service. In the life of the individual, experiences are confusing in their abundance. They seem often in disagreement. One set of experiences turns thinking in a given direction, and another set turns thinking in the opposite direction. As a result, instead of a steady, straight-ahead flow of the "stream of consciousness," there are crosscurrents, eddies, rapids, and whirlpools. Experiences which seem in disagreement are not helpful as determining factors in the individual's responses to situations he must meet. Such experiences are not in shape for utilization. They become useful only as the individual brings them into agreement, into mutual helpfulness, into appropriate relations. The school teaches its pupils methods of organization which bring experiences into the arrangements that make them ready for use. It undertakes to transmit to its pupils the methods of thinking which earlier generations have developed and found useful.

We may state the matter in another way. The school seeks to substitute trained responses for untrained and accidental ones. The child in civilized society lives in an environment of social arts, social modes of thinking, social attitudes, and social modes of behavior. To gain the benefits of this environment, he must adjust his behavior to its requirements. The school endeavors to lead him into a reasonable minimum of adjustment.

The adjustment we have mentioned is not easy to learn. In the modern world it is so difficult as to require the undivided efforts of a special institution to teach it. Thus, the school has come into being as an agency to substitute for the haphazard, accidental, blundering responses of the untrained child the systematic, appropriate, and profitable responses which society's arts and its modes of thinking and feeling and behaving require. Later discussions will describe in less general terms than are possible here the types of response which the school seeks to encourage. It is sufficient for our present purposes merely to indicate that the school seeks to teach its pupils how to respond in new and effective ways to the social arts, such as reading, writing, and music; to social modes of exact thinking, such as the language of number and the methods of science portray; and to a broad, social view of society's structure and society's activities, which the literature of the social studies describes.

Summary. The present chapter indicates the education of pupils as a movement from untrained responses to trained responses. In anticipation of succeeding chapters, it presents the following propositions:

1. The purpose of the school is to provide the situations for learning.
2. The pupil's learning results from his responses.
3. Untrained responses are different from trained responses.
4. Education is the difference between an untrained and a trained intelligence.
5. Intelligence results from intellectual growth and development.
6. The school aids its pupils in utilizing experiences.

The next chapters. The two opening chapters have developed a number of introductory propositions which are summarized in the following general statements:

1. The school is a unique educational agency which society maintains to introduce the members of the younger generation to the social arts, to the exact methods of thinking that make cooperative activity in society possible, and to a broad view of the structure of society and of the cooperative activities that society fosters for its perpetuation and the perpetuation of its service agencies.

2. The purpose of the school is to provide its pupils with situations for learning, to help its pupils both to gain and to organize experiences, to assist them in substituting trained responses for their untrained, accidental ones.

The chapters that follow provide a double view, both general and in some detail, of the responses of pupils as these responses change from untrained to trained ones and of the activities of the school in fostering and guiding the transition. The double view appears in a series of three steps of discussion.

The first step is a description of behavior and mental states and processes in general. This description may provide a broad, general, and often vague picture of mental activity under the conditioning of the learning situations of the school. Our purpose is to gain a view of the forest, as it were, before we move up to look at the trees. The first step of the discussion is provided by the following Chapters:

Chapter III.	Spontaneous Behavior
Chapter IV.	Directed Behavior
Chapter V.	Impulsive Behavior
Chapter VI.	Habitual Behavior
Chapter VII.	Perception and Imagination
Chapter VIII.	Memory
Chapter IX.	Feelings and Emotions
Chapter X.	The Integration of Behavior

The second step is one of analysis. We leave our bird's-eye view of the forest to study the kinds of trees. The purpose is to gain a view of the most important types of mental activity the learning situations of the school seek to foster. Or we may say the purpose is to trace in first one way and then another the transition of the responses of pupils from an untrained immaturity to a trained maturity. The second step of the discussion is provided by the following Chapters:

Chapter XI.	Developing Skills
Chapter XII.	Building Perceptions
Chapter XIII.	Experiencing Meanings
Chapter XIV.	Extending Experiences
Chapter XV.	Attending to Abstractions
Chapter XVI.	Drawing Conclusions
Chapter XVII.	Learning Methods of Thinking
Chapter XVIII.	Acquiring Appreciations

The third step returns us to a general view. We may perhaps take in the picture of the various learning activities of the school operating in united movement toward a common goal. The third step of the discussion is provided by the following Chapters:

Chapter XIX.	The Motivation of Learning
Chapter XX.	The Transfer of Learning
Chapter XXI.	The Measurement of Learning
Chapter XXII.	Individual Similarities and Differences
Chapter XXIII.	Levels of Learning Activity
Chapter XXIV.	Standards of Conduct

A word of caution. Mental life is a movement. Whether swift or slow, straight ahead or in crosscurrents, broad or narrow, on much the same level or from lower levels to higher, it is a movement. There is no one spot in its course which is characteristic of the whole. There is no cross section which depicts it. Its movement at any one point is only in part the result of surrounding influences at that point. In the main its movement at any one point results from the combined force and direction of a long series of earlier influences and the possibilities and opportunities, the onward course, and the goals that appear ahead. Its beginning and its ending are not confined within the limits of the lessons which the school seeks to teach.

The discussions of the mental life of pupils in school which follow are in no sense of the term complete. They have at all points a double limitation. In the first place, they of necessity employ static terms—words, phrases, and sentences—in static chapters on static pages. With such instruments alone the discussions attempt to treat dynamic mental activity. In the second place, the discussions of necessity treat at any one point only a single phase, or a single set of phases, of mental life from a single angle or point of view. They give the appearance of stopping the mental machinery in order to call attention first to this gear and next to that shaft, or of describing the flow of the consciousness stream as it may appear first from a point on one bank and next from a point on the opposite bank. If such discussions are to be of help to the reader, he must supplement them as he reads along. He must read out of any one discussion much more than the writer has put into it. He must say to himself: "This is one way of describing the active, more or less organized, complex personality of the pupil as he appears from such and such point of view. Let me see how he appears from this and that other angle at the same time." The reader must read between the lines.

Part II *Behavior and Mental Processes*

Chapter 3

Spontaneous Behavior

Purpose of the chapter. To enable the individual to make the necessary adjustments to the ever-changing situations that confront him, nature releases nervous energy in amounts that are in proportion to the intensity of the excitations the situations arouse. For the emergencies of life—the new, the untried, the unknown, and the suddenly developing situations—nature releases large amounts of energy to care for the difficulties; whereas for the usual, ordinary, everyday situations, it releases energy in much smaller amounts. This release of nervous energy, in whatever amount that may be necessary to enable the individual to cope with a given situation, produces results that are important factors in learning—namely, behavior that is external and objective, and experience that is internal and subjective. No study of the behavior of pupils in the learning situations of the school can profitably neglect consideration of these important factors.

The present chapter will direct attention to the ways the impulsive behavior of the individual in everyday situations contributes to his intellectual training. It will discuss three common manifestations of such behavior: (1) curiosity, (2) imitation, and (3) play. A later chapter will discuss the origin of impulsive behavior and the need for correcting certain types that may have been permitted to arise. A still later chapter will discuss the behavior and the inner subjective experience which the unusual situations of life provide.

1. Curiosity

Curiosity is a tendency to acquire knowledge for its own sake. Curiosity makes us seek knowledge merely for the sake of finding out. Sense of need for the new knowledge, or of its possible usefulness, or of its practical value, is absent at the moment. We merely want to know. Why we want to know, or what possible good discovery will do us, we do not consider. Though curiosity leads us into embarrassment and difficulty, as was the case of Pandora, or to the discovery of useful information, as is a common experience, ulterior purpose is not present. We take no thought of unpleasant consequences, or of useful benefits, but act as impulse drives. We seek knowledge for its own sake; we seek experiences to learn what they will be like. Curiosity is the natural desire to look and see, to listen and hear, to uncover and find out the things which seem hidden.

The things we see, or hear, or know, especially if they are new or unusual, arouse an interest in seeing, or hearing, or knowing more of them. The things at hand in experience suggest things just beyond to look for, or listen to, or learn about. The appearance of a new toy, or a new model of automobile, impels in the child or the adult a desire to examine. The relating of an experience impels the question: What happened next? Knowledge of what the puzzle is like makes us want to know how the puzzle works. The sensing of a problem makes us want to solve the problem. The early incidents in a story make us want to read on to find how the story ends.

Curiosity is a common possession of children. Children seem to be curious about everything. They ask innumerable questions. They pick up and examine all sorts of objects. They want to see inside their toys and inside numerous other objects that come within the range of their attention. Though their curious desires seem to make them destructive creatures, they usually have no notion of destruction. They merely want to find out how things fit together and what makes them work.

The child's world and all things in it are new to him. Every day he sees some new thing, or has a new experience. What is it like? How does it work? What is inside? What makes it go? These questions impel him to action. He has no ulterior purpose to accomplish, no far-off goals to reach, no remote ends to serve. More than at any other time in his life he is eager to learn. Knowledge for the sake of knowledge is a reality in his life, however remote this craving finally becomes in the practical world of the adult and however much the adult often tries to read into the child's activities a practical motive.

Curiosity is an aid in education. The child is in a new world when he comes to school. There are new friends to make, new sights to see, new items of information to acquire, new activities to perform. His teacher has interesting stories to tell. His teacher passes on interesting items of information about strange and hitherto unknown persons and peoples. These stories and items of information excite his curiosity in related stories and related items that are hinted at in the accounts to which he listens. "Tell another story," "Then what did the Indian do?" and similar expressions indicate the presence and influence of the pupil's curiosity.

Before he came to school, the pupil had learned a number of things about its activities. He wants now to learn more. In school he is introduced to many activities, all new. He wants to get into them, to be a part of them, to find out about them. To learn what the activities are like, what others do in them, and what he is supposed to do is the driving impulse. Though the teacher may have in mind a useful purpose or a remote goal, the pupil has no such ulterior motive. His desire to discover crowds out thought of purpose, even when he seems able to understand purpose. Whether the activity has a purpose or not, to him it is the thing to do. He is as much concerned, no more and no less, about an activity whose purpose is to teach a lesson as about one that merely amuses. He is usually so wrapped up in doing as to be entirely uncritical of his manner of doing.

The teacher loses patience with the imperfections of the beginner's work. The teacher attempts a remedy by calling attention to later uses and values. As a result, the teacher defeats his purpose by causing the pupil's initial curiosity to diminish. The pupil has only a limited amount of mental energy. If he must try to think about the efficiency of his activities and about possible uses and values, he will have left so much less energy to expend as his curiosity may direct. Besides, the pupil is more interested in learning what the activity is like and less interested at the moment in being able to engage in it according to rules. Thus it happens that too early an insistence upon perfection, or too early an appeal to ulterior uses and values, results in a lessening of the pupil's interest in the things he would otherwise be very curious to learn.

The school may give direction to the pupil's curiosity. Two facts stand out. One is that curiosity may lead to the discovery of all sorts of information, both useless and useful. The other is that what a person discovers as a result of his curiosity depends upon the type of situation that confronts him. It follows then that the teacher can use considerable discretion in arranging the learning situations of the school. He can so plan the work as to give wise direction to the pupil's curiosity. He can select, organize, and set up the activities that will lead the pupil to acquire a working mastery of certain social arts and a working knowledge of the information that society has found to be useful to know. He can thereby open to the pupil new areas for the exercise of curiosity.

To illustrate, let us suppose that the teacher takes advantage of the beginner's curiosity in new activities to lead him to engage unreservedly in those activities that gradually lead to a mastery of the art of reading. As the pupil gains such mastery, he becomes aware of the possibility of discovering in the world of books much information that is new and unusual. As a consequence, he becomes curious to discover by reading what the new and unusual information is like. The discoveries he makes through the reading of one book suggest more to be discovered in other books. As he reads and reads, his curiosity grows by what it feeds upon.

Curiosity may disappear or take a new direction. When the child has seen inside his toy, or the adult has examined the new model of automobile or pursued his detective story to the end, he is usually no longer interested in it, for he has satisfied his curiosity. He has discovered what he can and knows of nothing else that he may still discover. This is the situation in the school when the activities finally become so familiar that they no longer intrigue the pupil. This is the situation when the course in history, or science, or literature, or mathematics, or art, is the kind that satisfies the pupil with what he has learned and leaves him without desire to learn more. Whenever the work of the school continues too long on the same level, or moves as it were round and round in a circle, curiosity about the nature of the work diminishes as it is gratified.

On the other hand, when the work moves ahead from one related topic to another, quite different possibilities present themselves. The pupil gains information that suggests other information to seek. He investigates a situation and gains an idea which in turn dimly reveals another related idea. He pursues a given round of activity and becomes aware of a new related activity that excites curiosity. The pupil may become increasingly curious as he proceeds from one situation to another, from one activity to another, from one topic to another, from one course to another.

Summary. Curiosity is the tendency to investigate merely for the sake of what may be discovered. Ulterior motive, such as thought of possible value or usefulness, is absent. Curiosity leads to discoveries of all sorts, including dead timber that clutters up the mind and knowledge that later becomes useful. When curiosity is gratified by a discovery, desire to learn what has been discovered vanishes. The result may be either satisfaction as regards the particular kind of information that has just been learned, or further desire to learn information that has been hinted at but is not as yet revealed. The school, accordingly, can use curiosity merely to serve immediate ends, or to serve ultimate purposes. Which purpose is served depends upon the type of direction the school gives to the manifestations of curiosity in its pupils.

2. *Imitation*

Imitation is both an impulse and a conscious tendency. Imitation in the broad sense is the impulse to copy, or follow, a pattern. When the impulse manifests itself in the activity of copying, or following, a pattern, we speak of the activity also as imitation. Like curiosity, imitation as an impulse is self-generated, and does not require consciousness of purpose. We may note the tendency to imitate in a flock of sheep, in a group of children, and in a crowd of adults when they follow their leader. We may observe imitation also in the behavior of a single individual. Using the piano stool as a prop, the little boy copies the actions of his father in driving the family car. The little girl plays at housekeeping in imitation of her mother. The child peruses books and newspapers long before he can read, and writes markings upon paper, in imitation of the literary activities of adults. He copies the speech of his elders, their dress and mannerisms; and, as he grows older, he copies the ideas and the modes of thinking of the society in which he happens to live. The child of English-speaking parents in France, for example, learns both English and French, because he is a creature of the impulse to pattern his speech after the one language in the home and after the other language on the street and playground.

Later in life, the individual engages in imitation in the narrow sense of the term. That is to say, he copies, or follows, a pattern because he consciously plans to do so. His imitation is not a spontaneous impulse, but a planned expenditure of energy to accomplish a conscious purpose. Discussion of this narrow type of imitation, the conscious type, we shall reserve for a later chapter.

Children are social imitators. Children are interested in doing, or in pretending to do, what their elders do. They follow the pattern their elders set. They think not of purpose or value. They think only of the activity. In the primary school, the pupils are like a flock of sheep. They will follow the leader, classmate or teacher, anywhere and into anything. One activity impels to imitation quite as much as another. Any activity will dominate if the leader emphasizes it and sets the example. As a consequence, the pupils of the primary school are no more inclined to dress a clothespin doll, play the game of bean bags, and hand articles across the counter of their play store, than they are to count objects in groups, form the outlines of letters and words, associate printed words with their meanings, and dramatize the meanings the words suggest. The leadership of the teacher is the determining factor. What the teacher does, or leads in doing, becomes for the time *the* thing for all to do, regardless of value or the lack of it. The attempt of the teacher to assign value, or to explain later use, serves only to detract from the force of the activity itself upon the imitative impulse. The motive of social imitation is a powerful force that impels children to participate in the planned activities of the school.

Imitation communicates attitudes. As the pupil moves ahead through the school, he becomes more an individualist with interests and activities of his own, and less a social imitator. Nevertheless, he still has a strong impulse to imitate. A good example of the prevalence and importance of the imitative tendency among older pupils is the communication of attitudes in what we are commonly pleased to call the social atmosphere of the school.

Strictly speaking, it is not attitude that a person imitates but rather the way he sees someone expressing it. The attitude that results in the imitating person comes from his own imitation. Attitude, though internal and subjective, manifests itself in some form of outward behavior or expression. This external manifestation is in reality a part of the total bodily response that we call attitude. It is this external manifestation that impels the observer to the activity of imitation. To the extent that the observer imitates, he induces within himself the total attitude of which the imitated activity is a part.

The matter may be illustrated in a number of ways. If a person in the stress of excitement or anger talks loudly and shakes a finger at his listener, his listener becomes inclined to answer in a loud voice and begin shaking *his* finger. It is not long until the listener is similarly excited or angry. Conversely, if the teacher speaks calmly and in a well-modulated voice, the attitude that is back of this manner of expression transfers indirectly to the pupils. The pupils tend to imitate their teacher's manner of speaking, and their imitation induces an attitude that is similar to the teacher's. A hearty laugh induces imitation which in turn results in a mood similar to that producing the original laughter. The new pupil tends to fit into the pattern of activity his new schoolroom has set. If, for example, the work activities are expressions of trained regularity and industry, and of confidence in their appropriateness and promise of success, the new pupil feels the urge to settle down to the work in which he sees all others engaged. To the degree that he is able to adjust himself to the pattern of the activities that surround him, he takes on the attitude to which these activities give expression. Conversely, when the newcomer in a school observes activity which is an expression of confusion and excitement, it is not long before he takes on through imitation a corresponding feeling of confusion and excitement. The social atmosphere of the school is quite as much the cause of attitude, favorable or unfavorable, as it is the result of attitude. Imitation is the medium through which attitudes travel. The manner of the teacher is more influential than his admonition.

Responding to suggestion is a form of imitation. The impulse to copy, or follow, a pattern manifests itself not alone in the imitation of activities that are present to the senses, but also in the imitation of activities that are present in imagination. In imitation of the latter type we see the influence of suggestion.

We commonly think of suggestion in terms of results instead of the means which produce the results. In the one sense, we suggest when we imply something or make a request. Thus, we do not distinguish between suggesting and telling. In the other sense, which is less obvious and less misleading, we suggest when we describe an activity or arouse an idea of an activity in another's mind. Thus we at times tell one thing, or try to, and succeed only in suggesting another. Response to suggestion is, in the former sense, obedience to direction; in the latter, imitation. The idea of an activity that one sees with his mind's eye is quite as stimulative of the imitative impulse as is an actual activity that he sees with his eyes.

Providing for the pupil's response to suggestion is frequently a time and energy saver. It is usually uneconomical of time and energy, as well as inconvenient, for the teacher actually to demonstrate the activity he desires his pupils to copy. If he can get the idea of the activity in the minds of the pupils, he can provide a pattern that is just as stimulative and, at the same time, a much better guide. Accordingly, the teacher can give directions and explanations of what he desires to be done to the end that the activity will take place, as it were, in the minds of the pupils, and thus impel them to imitate.

Frequently, however, the suggestion of the teacher goes astray, and the pupils respond in a manner that is exactly the opposite of the teacher's intention. It is at this point that pupils are said to rebel against suggestion; the intended suggestion turns out to be what we may call "negative suggestion." Apparently, the teacher suggests one thing and the pupils do the opposite; actually, the pupils do what the teacher has suggested to them. For example, the teacher directs that the pupils do not crowd or shove each other as they pass in line out to the playground. What the teacher actually does, as regards some of the pupils at least, is to convey the idea of crowding and shoving. Crowding and shoving thus becomes an imagined activity, and, if the teacher does not look sharp to prevent it, crowding and shoving will be imitated. In appearance, the offending pupils have been disobedient. In actual fact, they may have had no such intention. They merely lost sight of the teacher's rule of conduct under the dominance of the activity the teacher described (suggested) to them without intending to. Far from being an example of a break in the imitative impulse, negative suggestion strikingly illustrates its continuity and influence.

Imitation is a diminishing influence. Our discussion of imitation leads to the point that imitation is a forceful influence in education, for it is the imitative impulse that initiates many of the activities that result in learning of one sort or another. At the same time, imitation is a diminishing influence. As the pupil learns, he learns to depend upon himself. He gains ideas and skills of his own. He becomes less and less subject to the influence of the tendency to follow the pattern set by his teacher. We may state the matter in another way. As a person develops a pattern of his own, he is less influenced by the pattern another may set. As he becomes more critical of the activities of others—that is, better able to judge their worth and defects—he is less subject to their influence. As he becomes more critical, he tends consciously to choose activities he wants to imitate, or thinks he ought to imitate. At this point, the imitation he engages in is of the "conscious" type, to be considered later, and not of the "spontaneous" type, with which we are here concerned.

Summary. Through the exercise of the impulse to copy, or follow, a pattern, the individual enters into many activities that fit him for the society in which he lives. Through imitation, he learns his mother tongue, and begins to practice the social arts and manners that are important for social adjustment. Through imitation, he induces within himself the attitudes and moods, both favorable and unfavorable, of the social group in which he lives. The motive of social imitation dominates the life of young children, not alone when they are uncritical followers of a leader and when they respond to suggestion, as it is desired and expected that they should, but also when they appear to respond to suggestion in a negative and apparently contrary fashion. Later in life, as they become more critical, they are less dominated by the impulse to copy and become the conscious choosers of the models after which they pattern their actions.

3. Play

Play is a form of spontaneous behavior. Closely related to the activity of imitation is the activity of play. Indeed, much of the imitative behavior of childhood takes the form of imitative play, such as "playing store," "playing house," "playing Indian," and similar activities. Like the activities of curiosity and imitation, play is self-generated and is carried on entirely for its own sake and not for the sake of results. Play, therefore, is an end in itself and, though it may lead to valuable ends, is not carried on as means to such ends. It is true that the directors of the child's play, his parents and his teachers, may have ends in view and may see in the play activities they encourage valuable means of physical and mental development. To the one who plays, however, no such results are carried in mind. Any reference to ultimate values, whether understood or not, serves only to distract from the play and to render it of less effect.

Play is an important phase of school activity. More than ever before play is in a position of importance in the activity program of the school. This is the case for reasons that are fairly obvious. In the first place, the school has been giving more and more attention to children as individuals, and has been endeavoring more and more to shape its program so as to make all possible use of the impulses and attitudes of its pupils. The school recognizes play as a natural activity, and regards it as an important natural means of development. Secondly, the school undertakes to contribute to the all-round development of children, and considers play one type of activity that assists in developing all sides of the pupils. Finally, the school has come to see the necessity of a varied program, not alone from the standpoint of many-sided development, but also from that of relaxation and recreation. It has become clear by repeated observation that a change of activity is a physical and mental relief, and that the individual is capable of responding with renewed vigor after a period of activity that provides a complete change of mental scenery.

Play is progressive in its development. The activities of play change with the age and with the physical and mental development of the individual. At the outset, the infant exercises his vocal cords by trying out the making of various sorts of sounds, and throws his arms about and kicks with his legs, all for the mere pleasure these activities give him. This is the babbling period, and also the period of the rattle, or the period of "pushing things around." Through the activities that characterize the period, the infant develops and brings under control many movements that are later of much use.

Next comes the period of imitative play to which we have made reference. This is the period of development in which the child is a social creature, and social imitation seems to dominate much that he undertakes to do.

Later, as the child begins to turn his attention away from people and toward himself, he becomes interested in those play activities that appeal to him as an individualist. During this period he is interested in plays of individual competition. This is the period of contests between individuals, of running and jumping, and of many like activities that serve as means of showing off.

Still later, notably with the onset of adolescence, comes the period of team play in which there is a social union of the youth's efforts with those of his companions in competition with others. This period in the development of play is modified by activities and tendencies that survive from the earlier periods. All the earlier forms of play tend to merge and ripen into the form of play that is characteristic of adult life, where the obstacles to be met and overcome in the games are intellectual and not merely physical.

Such intellectual competitions and games have a place in the child's school life, and serve a useful purpose in the learning situations of the school.

Play is a natural form of education. In former days the significance of play was misunderstood, and no value was attached to it as an agency of education. It was thought of merely as a trivial and useless activity of childhood, and as one that had no place in the important business of education and of preparation for adult life. Later, the value of play as a factor in the learning process was given expression in one after the other of several theories. These we may summarize as follows:

1. *The surplus energy theory.* Play is exuberant activity. It releases surplus energy and acts as a healthful safety valve.

2. *The preparation theory.* Play is the instinctive preparation in the young for the serious activities of adults. Through the preparation play provides, it has great social value.

3. *The recapitulation theory.* Play is the repetition in the child of the earlier activities of the race, and satisfies the tendency to repeat racial activities. It thus has a cathartic value. Children tend to fight because fighting was a racial activity. Play gratifies and lessens the tendency, but may not entirely remove it.

4. *The relaxation theory.* Play is a change of activity from that which modern life demands to that which the individual instinctively tends to follow. Again, play is a release.

5. *The compensatory theory.* Play compensates for the inability to participate in the real activities of life. Children wish to pursue the activities they see others performing, though they are as yet unprepared for them. Play provides the pretense that gratifies their wishes.

6. *The freedom theory.* Play is free from the conflict of external demands and motives. In play externals do not influence. They exist only to be ignored. If they must dominate an activity, the activity is not play until satisfactory adjustment is made. Finally, when adjustment is made, interest is no longer in the externals, and the activity becomes play.

Play is a means of education. In the school the teacher may take advantage of the pupil's impulse to play. The teacher may suggest and give supervision and guidance. The teacher may turn the impulsive tendency to play into activity that is a strong support of the educational purposes he has in mind to fulfil.

The pupil turns free his full energy in his play. He makes his play effective activity. He thereby gains experiences that are impressive and, consequently, lasting. Through guidance his play may provide experiences which at the same time are educational.

Play promotes health through exercise. It develops muscular coordination. It brings the pupil into contact with objects that broaden his knowledge and with other pupils who stimulate his social consciousness. In play he learns to make adjustments, to observe rules, and to respect the rights of others. Play may be an aid in introducing him to the social arts and the social modes of thinking that characterize adult life.

Many of the learning activities of the school resemble the activity of play. They have, at the moment at least, no purpose that the pupil can understand. They are only things to do and things that others do. They have for the time being no other interest. Observing the spellings of words, drilling in handwriting, practicing adding or dividing, and working at piano exercises are illustrations of these learning activities.

When the pupil is skillfully guided in taking up any such activity so that he feels certain about what he should do, he is ready and willing to participate. To him then the drill or the practice exercise is like play. It is play. It is of itself alone a game. It is something to do just for the sake of the doing. It does not need a game to be attached to it. It does not need to be modified so that it resembles any well-known game that children play. The teacher is in error when he tries to turn any such learning into another kind of game or to connect it with another kind. He is not fully aware of the nature of the activity he is trying to change. The spelling bee and the ciphering match still retain their old-time interest for the modern youth who has the privilege of engaging in them.

Play is not the sole guide. Play is not the only form of activity used in the education of the pupil. It is only one among several forms. In the management of the education of the pupil it is important to use all helpful forms and to keep them in balance. The good teacher has in mind ultimate goals and he uses any and all effective means of moving pupils toward the goals. If certain means are like play and agreeable, well and good. If others are like work and at the moment lacking in agreeableness, also well and good. The good teacher does not rely upon the vagarious play impulses of his pupils to determine what the school program shall be. The teacher who is so enthusiastic about play as to do otherwise would profit by the effort to note the distinction between means and ends.

Summary. At the beginning of the child's development, he engages in numerous bodily activities merely for the pleasure derived from the satisfaction of responding to his impulses to action. Through these activities he develops considerable control over various movements he needs for later adjustments. As a child, he is impelled through the motive of social imitation, or imitative play, to dramatize many of the activities he sees adults engaging in or hears them suggesting as a pattern for him to follow. At this period he is not critical of what he does or of what he makes. He is satisfied if his products stand in his own eyes as symbols of the real activities and models he is attempting to copy. Later on, he is interested in the plays and games that serve to demonstrate individual ability, and still later he is willing to cooperate with others in team play against competitors. Finally, all his incentives to play combine to produce the play interest of adulthood wherein the obstacles to be met are intellectual, instead of merely physical. Throughout the individual's development, his play incentives and play activities may serve as valuable means of education.

Chapter 4

Directed Behavior

Purpose of the chapter. The behavior of the individual, which at first is spontaneous, or self-generated, quickly becomes responsive to influences that press upon him from the external world in which he lives. More and more the developing individual comes under the control of influences from without, however much his development appears to be in the direction of self-control and independence. At first, the external influences act upon him directly. He is fed, clothed, housed, protected, and cared for by his parents, and his every step is guided by members of the older generation. Later, he takes on more and more responsibility in choosing his activities and the courses his behavior will follow. Thus, it appears that he learns to break away from the influences of the external world. Actually, however, the development of independence does not remove him from the forces that are external. It merely changes the pathway these forces must take as they impinge upon him. At first, they act directly. Later, they act through him in order to act upon him, and they act as his developing personality guides them. For independent action a person does not withdraw from the influences of the external world. Instead, he manages them and adapts himself to them.

The theme of the chapter grows from and departs from the theme of the preceding chapter. The preceding chapter called attention to the types of behavior that result spontaneously from external influences. The present chapter indicates the direction external influences give to behavior, and the way improved behavior modifies and uses external influences. It presents three topics: (1) interest, (2) attention, and (3) play and work. The theme is directed behavior.

1. *Interest*

Interest is mental disturbance. The etymology of the term "interest" indicates what the word signifies. The term derives from *inter esse,* "to be between," "to be different," "to make a difference." Something to become of interest has first to enter consciousness, "to come between" the conscious processes. To the extent that something does this, it influences the conscious processes. Literally, interest makes a difference, and becomes a matter of conscious concern.

Interest is a disturbing of a person's mental equilibrium. It is the opposite of complacency. It is usually agreeable, yet it is not the same as a feeling of satisfaction. In the case of interest, it is the lack of satisfaction that impels a person to seek satisfaction. When his thoughts are evenly balanced, and he is completely at ease, he has no interest. At such a moment, if he does not fall asleep, suppose he thinks of some activity, or experience, or idea. At once, his complacency is disturbed. His mental equilibrium is thrown out of balance. He is suddenly awake with interest.

Interest is related to meaning. It takes more than mere immediacy to make a thing have interest. The presence of an object, if it has no meaning—if it does not signify something to be picked up, handled, examined, avoided, played with, or otherwise used—creates no mental disturbance, and hence no interest. Similarly, seeing an activity whose purpose is not understood, or hearing the expression of an idea that is not clear, does not stimulate effort and interest. The book on the table of itself does not invite a person to read. If he tries to read and pays attention to the forms of the words but neglects the ideas they express, he does not long continue the activity. In the comfortable chairs of a well-stocked library people have often been found asleep.

What a thing means is its interest. Meaning and interest are identical. Difference in interest is no more nor less than difference in meaning. When a person has an interest in a thing and examines it "to see what it means," he merely starts with some meaning and seeks more. When the interested student studies his lesson, he does not have interest first and meaning second. He begins with meaning and studies to get more. Interest differs as meaning differs. To illustrate, two pupils may read the same story. If the one merely recognizes the words, and the other recognizes both words and meanings, there is a difference in interest. Again, two pupils may attack the same problem in arithmetic or algebra and arrive at the correct answer simultaneously and by identical computations. If the one proceeds knowing the kind of answer he should seek, and the other proceeds by rule-of-thumb methods, there is a difference in interest. Yet again, two pupils may draw identical figures to demonstrate a proposition in geometry. If the one draws his figure merely from memory, and the other draws his figure as a method of picturing objectively his insight into the demonstration he has come to understand, there is a difference in interest.

The identity of meaning and interest appears in every activity the school sets up and directs. As a final illustration, let us picture the activity of playing store as the pupils in two third-grade classrooms carried it on in apparently identical ways. In each classroom, the pupils under the guidance of the teacher had set up a "store," provided with a counter, shelves, and things to be "bought" and "sold." The pupils took turns acting as clerks and customers. At this point the identity stops. In the one classroom, the teacher used the activity to stimulate the pupils to learn the simple additions and subtractions and a few of the simple multiplications. In the other, the teacher's purpose was to provide one of several means of practicing the meaningful applications of the simple processes after they had been learned. The pupils in the former classroom found the arithmetical operations to be an activity that distracted them from the activities of storekeeping which they understood. The pupils in the latter used the arithmetical operations in their buying and selling to determine the values of these activities. In both classrooms, the pupils exhibited considerable interest, but they were interested in ways that were very different.

Interest manifests itself in activity. Interest is not a mere passive feeling of pleasure, or an attitude of satisfaction. It is rather an intruding element in consciousness that works itself out in the modification of behavior. The feeling that accompanies interest is a feeling of mental agitation. This feeling is especially noticeable when interest is intense. At such times it has the nature of an active force that propels and guides behavior. The guidance given and the result are not necessarily objective. In this connection, we recall that behavior is both objective and subjective, physical and mental.

Interest develops through association. The formula for developing interest is the formula of association. It is what we associate that counts. We do not "make things interesting" by placing in them the interests that belong in other things. We do not rightly associate things that do not belong together. Properly to make associations, we must know the things that belong together well enough to recognize the ways they actually relate. To relate the meanings of things we must first gain their meanings.

When a thing has no meaning, it has no interest other than the interest which leads to avoidance. To dress it up in interesting garb does not create an interest in the thing itself. It creates instead an extrinsic interest in the way we dress it. Telling an interesting story does not create interest in the class exercise. The interest remains in the story, and may even draw attention away from the exercise. The way to create interest is to develop meaning, and we do not develop meaning through distractions.

Meaning comes, as we have indicated, from knowledge of the nature of the thing and of the elements which compose it. Since nothing in the world is entirely an isolated object or fact, part of the nature of everything exists in something else. Similar elements have similar meanings. The new experience or the new thing to be learned has some feature that is common in older experience and in things that are known. Thus the new follows from the old, relates to the old, and gets some of its meaning from the old. When the primary pupil learns to divide, he must count out and think about the whole group, and from it he must count out and think about the smaller equal groups that compose it. Finally, he must count and think about the number of the equal groups. Thus, in a sense, the pupil does nothing new and different in taking up the new and different study called division. He continues in his dividing the activity of counting out and thinking about the numbers of things in which he has engaged himself heretofore. Through dividing—that is, through a new association of the things he knows—the pupil creates a new meaning, the meaning of dividing. He develops his interest through association. Thus, when we learn and understand the common elements in things and gain the common meanings, we associate interests and enlarge them.

Interest is both a result and a cause of learning. Our discussion to this point brings up two major facts about interest. These facts are familiar to teachers who take a balanced view of the work of the school. The more familiar fact, and the one that seems more to impress teachers, is that the interests of pupils are important factors in determining the kind of work they do in school. This fact is so familiar that it needs no description. Here is a pupil who reads many books, because he is interested in reading. Here is one who gets along well in mathematics, or science, or literature, or history, or music, and is willing to work hard and long at his assignments, because he is interested. This fact of interest impresses us so much that we tend to neglect the second fact, a fact which is perhaps more important for us to consider. The second fact answers the question: How do interested pupils become interested?

The answer should be clear. The pupil who is interested in his schoolwork, or in any phase of it, is interested because he has learned how to do it in a significant and productive way. Interest in reading follows, or at least parallels, learning how to read. Interest in mathematics grows from a developing understanding of mathematics. Interest in history, language, literature, science, or art, is no greater than the amount the pupil has learned to understand in each. Of course, in every subject or activity, we may note a superficial interest similar to the motive of social imitation of primary pupils, a motive which serves as a good mechanism to initiate school activity. But the interest we consider here is not on the surface of things. The interest we consider is the real *inter esse* of a subject or an activity in consciousness. This interest is a development of meaning that comes from study of the essence of the subject or activity that gives meaning. There is no substitute for this particular method of gaining real interest. There are no short cuts; there is no easy royal road. The pupil must study the subject at hand, or the phase of it that parallels the degree of understanding he possesses at the moment. His teacher does not help by sugarcoating the pill or by trying to "make interesting" the subject or the work at hand. To do so merely distracts. The real help the teacher can give is to map out the work in steps which the pupil can take, and then see that the pupil takes each step as he comes to it. Each step gives the pupil a better view of his subject, and thereby extends his knowledge and the interest which knowledge gives.

Intrinsic interest must be achieved. Interest in things and activities for their own sake must always be an achievement. It is never a gift. In their enthusiasm for intrinsic interest, teachers frequently forget this fundamental fact.

Often the teacher seeks to select and to set up in his school the activities that seem to him to be intrinsically interesting to his pupils. As they appear to him, the activities cannot be anything but intrinsically interesting. Indeed, they would be to the pupils, if the pupils had the teacher's superior point of view, or if their view were what the teacher sometimes thinks it should be. To illustrate, the teacher may surround the pupils with books, laboratory equipment, musical instruments, pictures, maps, and other appropriate devices of instruction; and he may expect the pupils to embark at once upon a wide reading program, careful experimentation, enriched musical activity, and the like. The teacher may find, however, that the inadequate achievement of the pupils prevents them from engaging in what might otherwise be very interesting activities.

Or the teacher may set up activities that turn out to be intrinsically interesting. At various levels of pupil development the teacher provides games, plays, discussions, dramatizations, and reenactments of life activities. Each type of activity, suiting the present level of experience and training of the pupils, derives its significance from this experience and training. But the activity provides interest only in itself, not interest in activity on a higher or more mature level. Besides, the activity on the low level of present intrinsic interest crowds out the activity which the development of new interest requires. The school that gives its pupils nothing but intrinsically interesting activities to perform stultifies their progress; the school that sets up activities leading to new meanings and to new interests is an educational institution.

Summary. Our description of interest as the directing force of behavior has developed in our discussion of the following topics:

1. Interest is mental disturbance.
2. Interest is related to meaning.
3. Interest manifests itself in activity.
4. Interest develops through association.
5. Interest is both a result and a cause of learning.
6. Intrinsic interest must be achieved.

LIBRARY.

2. *Attention*

The lessons of the school are lessons in attention. The lessons the school seeks to teach are lessons in paying attention. When the child enters school, he encounters a multitude of sensations and impressions which press upon him from his new experiences. Everything is new, unusual, and strange. Everything attracts his attention. His attention moves in rapid succession from one thing to another. Every object and activity that his eyes see and his ears hear are sources of distraction. If his companion has a toy, he reaches for it. If someone has a colored crayon, he wants to mark with it. If an activity starts, he wishes to join in. He has the natural impulse to make physical contact with every object and activity that stimulates his senses.

In the midst of the confusing experiences of the first days of school there appears an individual who seems to know the way around and through the circumstances that arise. To this person the child turns to guide him through his confusion.

The teacher—the good teacher—takes advantage of the opportunity. The teacher calls forth the meanings the pupil should associate with printed words. The teacher indicates the systematic ways a group of objects may be arranged. The teacher traces the shapes of letters and shows the pupil how to make the letters himself. Throughout, the teacher provides the language that directs attention, and trains the pupil to use the language that fixes attention. As the pupil progresses through the school, he learns not merely about addition and percentage or about man and his machines or about people of other lands and times or about the nature of proof and how to perform an experiment. He learns, too, how to neglect distractions and how to give attention and energy to the thing at hand that he must do. He learns to neglect the things he can see and hear and to give attention to the things he knows. He learns to attend less to things and more to ideas. His lessons in arithmetic, or geography, or science, are lessons in the concentration of attention.

Attention is both spontaneous and directed. When a person pays attention to something, he converges his energy, physical or mental, upon it. He "attends" to it. He gets busy with it and has an attitude toward it. We use the term "attention," therefore, to indicate an action or an attitude, a way to deal with something or to think about it. We do not use the term as the name of a "faculty" of the mind or of some obscure kind of mental "tool."

We commonly classify attention as of two types, spontaneous and directed. We distinguish the two types according to the influences that control behavior when we adjust to a situation. In the former type of attention, the influences are confined to the situation itself. In the latter, the influences are outside the situation. Thus, if a student converges his efforts on preparing his literature or geometry lesson, the attention he gives is spontaneous. If he hears the call of friends and tends to look out the window, but brings his efforts back to his work, he then directs his attention. In the latter circumstance, the student makes a conscious effort to continue doing his work. He has a sense of obligation to do it. In the case of spontaneous attention, the activity or the thing at hand seems to draw the effort a person gives. We may say with some degree of truth that in spontaneous attention the situation at hand seizes or takes possession of the mind, whereas in directed attention the mind goes out and seizes the situation.

We may distinguish between two types of spontaneous attention. For convenience, we may call them primary spontaneous attention and advanced spontaneous attention. The immature, untrained child gives attention to what he sees and hears. As he gains maturity and training, he gives attention more and more to what he knows. Thus he advances from the primary spontaneous to the advanced spontaneous. To pass from one to the other of these two forms of attention, a person must expend his effort, and he must guide his effort while doing so. This form of using effort we have called directed attention and, from its nature, we may call it active attention. Active attention is transitional. It takes a person from the lower to the higher activity of spontaneous attention. We have now three types to consider: (1) a primary spontaneous type, (2) an active type, and (3) an advanced spontaneous type.

Primary spontaneous attention centers on the appearances of passing situations. In the economy of nature, survival depends upon the tendency to be attracted by every change in surrounding conditions. Every rustle in the leaves and every change in light and shadow that denotes movement draw attention toward themselves. If the animal, or man in a state of nature, were not attentive to every slight change that departed from the ordinary, he would not long survive. Thus we may explain, in the case of the animal and the small child, that attention is spontaneous, involuntary, passive. We have seen how the attention of the beginning pupil turns to and from every changing phase of the new social situation in which he finds himself. The visitor to a kindergarten or first-grade room notices this kind of attention as he opens the door and enters.

The appearances of things attract primary spontaneous attention. That which the eye can see or which otherwise strikes the senses is the stimulating cause, and attention turns naturally and without volitional guidance in that direction. The purpose, if we may think of spontaneous activity as having purpose, is to secure more sensation from the object that stimulates. As quickly as the purpose is satisfied, attention lags and turns in the direction of another stimulating cause. Primary spontaneous attention is thus a fleeting type of attention. It takes a direction that constantly changes. It never holds behavior very long to the requirements of any given situation, for when the appearance of one is grasped the appearance of another stands ready to attract.

From the point of view of maturity, primary spontaneous attention is a diffusion and a dissipation of effort. Yet it is highly significant in the life of the immature. Because the child gives attention to everything in his environment that appeals to his senses, he builds his experiences. He acquires tendencies toward things that give pleasure and tendencies away from those that prove to be painful.

Active attention centers on ideas. Ideas, or acquired tendencies, explain active attention in its most primitive forms. To gain pleasure or avoid pain, let us say, a person tends to fix attention upon the situation that produces the one or the other, and to neglect at least in part the tug that is made by the appearances of other situations. It may be that these other situations would otherwise be the more attractive. Yet an idea of a sort, a meaning, or a significance, attaches to the less attractive situation in question, and gives it the greater appeal. More than one situation pulls attention at a given moment. Active attention arises out of the conflict of these influences. Dominating the conflict is the influence of a given idea. Thus behavior comes to be directed less by the appearances of things which are present in the physical world without, and more by the meanings they arouse which are present in the recesses of the mind within.

As experience accumulates and as learning proceeds, the goals of behavior become less and less immediate and present, and more and more remote and ideal. For example, the pupil at work voluntarily shoves to the back of his consciousness, as it were, the ideas of immediate pleasure that come from the various sensory allurements surrounding him. He actively holds his attention to the lesson or assignment that he feels he must prepare. The pupil has learned of the satisfactions that come from work well done, though these satisfactions may be no more remote than the end of the month when the teacher will report on the status of his work in school, and his parents and friends will perhaps reward and commend him for his successful efforts. During the days that intervene between reports the idea of what successful performance means serves to direct his attention amid the distracting influences of his physical surroundings.

In the conflict between remote ends and present allurements, the former frequently go down in defeat. This happens when present allurements become more than ordinarily numerous and strong. To avoid defeat by these allurements, the wise teacher makes provision that the distractions of the school routine will be as few as possible. The teacher manages the daily activities so as to reduce them as much as possible to system and order and regularity. The wise teacher, however, never goes so far as to remove, or to try to remove, all learning difficulties from the pupil's path. The best conditions for intellectual work are those in which a person is reasonably free from distracting influences. At the same time the best conditions are not always those that seem to be the most satisfactory. The reason is that the presence of certain difficulties to overcome presents a challenge to the pupil and stimulates him to put forth efforts that he would not otherwise use, and to hold his attention more actively and with greater persistence to the task at hand than he would think of doing if no such obstacles were present. All this is a way of saying that the force that directs and holds active attention is a power from within, an idea of end not immediately present, an idea that may become more powerful through the goading of reasonable opposition and challenge.

Remote ends, to be effective, must be understood. In the case of the individual who is growing in intelligence, remote ends become more and more powerful influences in directing the course of behavior. For such a person, remote ends gain in significance and become, as it were, immediate facts that are present in consciousness. Conversely, at the earlier stages of the individual's development in intelligence, remote ends are not so powerful. They have then little, if any, meaning that brings them to the center of consciousness. Thus it is that the importance of working toward remote goals impresses him less than it impresses his elders. Thus it is that his teachers are frequently misguided in their efforts to provide motives for the learning activities they try to set up.

Often, as a means of motivating the learning activity, the teacher tries to call attention to the ultimate practical usefulness of what the pupil should set out to learn. The teacher thinks that the idea of such usefulness will help the pupil to neglect distractions and concentrate upon the work at hand. Yet the appeal to remote ends is often unproductive. One reason is that the end of practical usefulness is so remote as to be of little significance in the present experience of the pupil. It seems so far-off as to have little practical connection with present demands. Another reason is that, even when the idea of practical usefulness seems clear and is present in consciousness, the pupil has learned so little about the subject as to make impossible any logical and understood connection between the idea of usefulness and the task at hand. The pupil may sense, for example, the satisfaction of being a good reader, or a good musician, or a good mathematician. He does not as yet understand how and why the tasks set for him are at all necessary in order to be a good reader, or a good musician, or a good mathematician. Not until the significance of remote ends begins to be clear do they begin to exert an influence on behavior. In the meantime, the pupil must depend upon less remote ends that he can understand. In the well-ordered school, such ends, combined with the pupil's curiosity and with his tendency to imitate and to be a part of the social situation in which he finds himself, meet the need for a motive that will fix and hold attention upon the reasonable tasks set by the school.

Active attention leads to understanding of actualities. The initial appearance of a school activity or series of activities sometimes creates desire in the pupil to engage in it himself. The new subject and new textbook attract attention. He sees an advanced class ciphering at the blackboard. He listens as it reads a foreign language. He watches it performing experiments in the laboratory. In such activities he imagines himself playing a part. Yet the appearances of activities quickly lose the power to appeal. As guides of behavior, they do not substitute for the routine demands of the social situation of the school. As we have indicated, it is useless to try to substitute remote ends before the pupil has progressed far enough to begin to understand them. The satisfaction that comes from attacking a hard and challenging task, from conforming with regularity to the routine demands of the school, from complying successfully with other forms of social compulsion, and from receiving a favorable report at the end of the term must be made to serve as the controlling influence. As guides of attention when the appeal of initial appearance begins to lose its force, there is no substitute for external pressure and for the idea of possible satisfaction through conformity thereto.

The voluntary neglect of distractions, in order to concentrate effort on the work a person has to do, gives valuable results. For the pupil to be able to neglect distractions and concentrate his effort, his teacher must plan the work the pupil should do and arrange its steps in sequence and properly grade them. And the teacher must make clear to the pupil what he should do. All this we know. Slowly the pupil learns what is beneath the surface of the activity he must perform. He learns what it signifies, how it grows out of and relates with what he has learned in previous exercises, and how it seems to suggest an activity or a process that logically succeeds. He learns, in short, the actuality of the learning situation in terms of its meaning as contrasted with its external appearance. Often the learning proceeds very slowly indeed. Often the real significance of what the pupil must do does not reveal itself until near the end of a long siege of daily performance in voluntarily holding attention to the work that is laid out. For these pupils, the work is discouraging. Many pupils, if left to themselves, would stop their efforts in favor of many other things that are of much more immediate interest. At such points, the function of the school, with its routine of well-regulated activity and its reasonable system of social demands, becomes clear. At such points, the good school continues to hold the pupil's attention and to help him hold it to his work, for it is only by employing voluntary attention that the pupil can gain meanings.

Advanced spontaneous attention is directed by actualities. The outcome of the employment of active attention has been indicated in foregoing paragraphs. It is the attainment of artistic and skillful procedures, the apprehension of meanings, the development of productive modes of thinking, and the gaining of enjoyments and appreciations on levels higher than any hitherto experienced. It is, for the pupils in school, the apprehension of the actualities of the various subjects and disciplines. Such achievement in the form of ideas is ever at hand as mental equipment that is a controlling factor in subsequent behavior.

Let us consider the achievement of ability to read as an example, though any other subject would be equally illustrative. As a person learns to read, reading enters his mental make-up as a permanent mode of behavior. Henceforth he approaches all situations and resolves all problems and issues in terms of reading. Henceforth he uses reading as a means of enjoyment and as a means of studying and thinking. To the extent that he can read with ease, reading is a major interest for him and it is a major factor in the control of his behavior. He will often arrange his daily schedule of work and play in order to provide time for reading. He will make sacrifices in order to provide himself with books to read. He will turn to reading as a means of discovering new interests and of losing himself for a time from the actualities of the external world. It is at this point that we see the employment of advanced spontaneous attention. No longer is reading an end on the outside that conflicts with other tendencies. It is now a dominating interest that is within. To the extent that the person can read with ease, reading crowds out other attractions and makes possible the giving of attention of the involuntary, passive type. Such reading is not effortful reading. It is an activity the reader engages in with an absence of conscious effort.

Correspondingly, the student who gains an understanding of what his arithmetic, or his geometry, actually is, as distinguished from its initial appearance, can lose himself for a time in attacking a challenging and difficult problem. Though he expends much energy to discover the solution, this expenditure is effortless because it is involuntary. Similarly, the student who has mastered a musical instrument has learned to play it with involuntary effort. Advanced spontaneous attention is an achievement in the grasp of things as they are. Such attention is of prime importance both as an end of school instruction and as a means of self-instruction on higher levels.

To this point our discussions have dealt with the distinctions and relations between three progressively productive stages in the activity of attending: (1) primary spontaneous attention, (2) active attention, and (3) advanced spontaneous attention. We shall conclude our discussions with a passing reference to two facts regarding attention in general: (1) attention shifts from one center to another, and (2) man possesses the unique ability to have more than one center of attention at a given time.

Attention shifts from one center to another. One of the most obvious characteristics of attention is that its range is limited. When a person turns his attention to one thing, he does not consider other things except vaguely. We may think of the objects of attention at any given moment in a field comparable to the field of vision. At the center the object is clear. Farther away in the margin of attention objects are less and less clear. As attention shifts to a given object in the margin, the object at the original center shifts to the new margin. Only as a person understands the common meanings of related things does he get them together at the center of his field of attention.

Man can attend to more than one thing at a time. For illustration of the way human beings can have at the same time more than a single center of attention, we may consider certain experiences of the primitive man. As savage man stalked his prey, he had it at the center of his attention. In the act of stalking, he tripped on a stout stick, a club. Now for a time the club was at the center of attention and the prey was in the margin. Then very quickly the prey was at the center again and the club was in the margin.

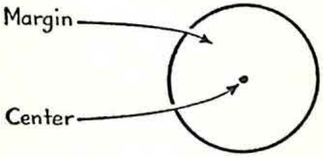

FIG. 1: *The field of attention*

Such experience is no different from that of an animal under similar circumstances. With both savage man and the animal there is a shifting of attention back and forth from one center to another. However, in the course of development, savage man discovered a relationship between the club and the prey he sought for his dinner. At this point, human experience departed for a higher level than is possible in animal experience.

FIG. 2: *Shifting fields of attention*

Physically, savage man had little ability that the higher forms of animal life did not possess. Mentally, savage man had a unique advantage. He had the use of words. He could not bring the prey and the club together in the center of his consciousness at the same time, but he could bring two words together. For the prey he had a word and for the club he had a word. The word for each substituted for each. The word took the place of his experience with each. Thinking the two words together gave an idea of a new experience that had not as yet existed in savage man's material world. The new experience in imagination was that of using the club as a weapon of attack upon the prey. The idea was an idea of relationship that the two words coming together had suggested. In turn, the idea suggested action, and through use the stout stick became an invented tool, something different from and beyond a stick as a mere fact of nature. Using words in ever new combinations, man has learned to hold many things in the center of attention at once. He has learned thus to work out complex relationships, first, as ideas and, later, as accomplished facts.

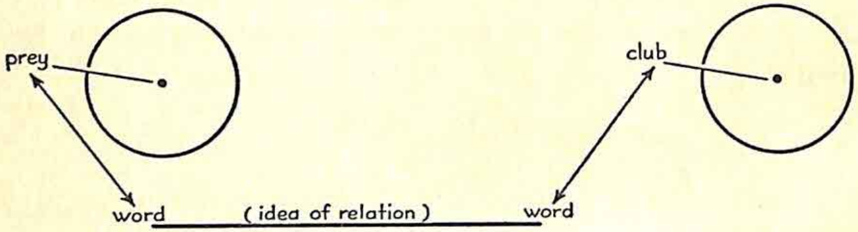

FIG. 3: *Relating two centers of attention*

Summary. We center our efforts in different intensities and in different ways on the things we observe, or imagine, or recall, and on the actions we undertake. We say that we make use of three types of attention: (1) primary spontaneous attention, (2) active attention, and (3) advanced spontaneous attention. We have distinguished the three types of attention in our discussion of the following themes:

1. The lessons of the school are lessons in attention.
2. Attention is both spontaneous and directed.
3. Primary spontaneous attention centers on the appearances of passing situations.
4. Active attention centers on ideas.
5. Remote ends, to be effective, must be understood.
6. Active attention leads to understanding of actualities.
7. Advanced spontaneous attention is directed by actualities.
8. Attention shifts from one center to another.
9. Man can attend to more than one thing at a time.

3. Play and Work

Attitude distinguishes play and work. Externally, play and work appear much the same. The attitude of the participant tells us whether an activity is play or work. He plays to gain the satisfaction that comes from the activity itself. He considers play, whether or not he does so deliberately, as an activity that is important in its own right. The attitude of the participant is the attitude of interest in the activity as an end in itself. He works, on the other hand, to gain the satisfaction the activity promises to provide. He considers work, whether or not he does so deliberately, as an activity that is important because it leads to important ends. The attitude of the participant is the attitude of interest in the activity as a means to an end. The performance of two cars on the highway may appear exactly the same. Whether the performance of one represents play and that of the other represents work is determined only by the intention of the drivers. One driver is out for a ride. The other has a destination to reach.

Play may be aimless or according to rule. Children may run about through mere exuberance of spirit, or they may run about chasing one another in a game like fox and geese. The adult may spend a day of vacation in desultory reading, or he may spend the day reading a historical novel according to a plan he has previously set for himself. He may wander over the hills as his fancy dictates, or he may pursue a golf ball which he drives ahead of him according to definitely prescribed and well-understood rules. In either case, the individual engages in the activity of play. In either case, the activity of the moment seems sufficiently important to pursue as an end in itself. In either case, the attitude is one of interest that is intrinsic in the activity being performed.

Intellectual activity may take the form of play. Daydreaming, mind-wandering, or woolgathering, is aimless intellectual play. Studying a subject in school according to the rules which the pupil knows and understands may likewise be play. While he studies, the pupil may become so interested in what he is doing that he forgets for the time the values of studying. Play of the latter type is of greater importance than play of the former type.

We should recall at this point that teachers generally wish to have their pupils know and keep in mind the practical values of the subjects they study. This impatience for quick practical results tends to reduce to a minimum the intellectual play into which the pupils may make their work. Thus, teachers sometimes stress the "social" phase of arithmetic. They precede a new process which the pupils must learn by a consideration of a practical social situation that seems to suggest the need for the new process. As the pupils learn the process, the teacher makes frequent reference to similar practical social situations. Sometimes the teacher gives so much emphasis to the social phases that the pupils have little chance to give attention to the process itself as one that could of itself intrigue their attention. As a consequence, many pupils move through the whole of arithmetic, and other subjects as well, without the thought ever occurring to them that the subject could be anything other than a means to an end. By stressing the practical values of a subject, teachers make it very difficult for the pupil to engage in the highly important activity of intellectual play that might otherwise be possible. The instruction of the pupils, instead of being broadening, is narrowing in the extreme.

Work is necessary in order to master the rules. The criticism of the premature social applications many teachers inject into the subjects they teach is that the activity these applications require never gets above the level of work. The criticism is not that learning requires work, and always much of it. The well-ordered program of the school that takes full advantage of all opportunities the subjects afford always provides work as the necessary preliminary to activity that is on the high level of intellectual play. Work in such a program is always a requirement, not primarily to meet the practical needs that teachers in their own maturity of attainment may readily sense, but primarily as a means of getting pupils familiar with sequences of the subjects which are the rules of the game. As an illustration, we may consider the learning of a phase of the subject of arithmetic. Learning in any other subject would serve the purpose quite as well.

The idea that we deal with tens, for example, in the operations of arithmetic the way we deal with ones, provided that we write ten's answers in the ten's position, is not a usable idea just as soon as the pupil puts it in operation. He must engage in much thoughtful practice in its use. This thoughtful practice, or practice in thinking, does not generate itself and does not keep itself moving. The teacher must set the stage for it and must see that the pupil does it. The pupil must give and hold his attention to the task in spite of interesting distractions. Work, such as this, is necessary if he is to learn this particular idea which may become a kind of rule of the game. But the activity of dealing with tens has no likeness of a game until the pupil learns the rule—that is, makes the idea his own. His only means of gaining the idea is by long-continued thoughtful practice, and this is work. He must work to make his arithmetic intellectual play.

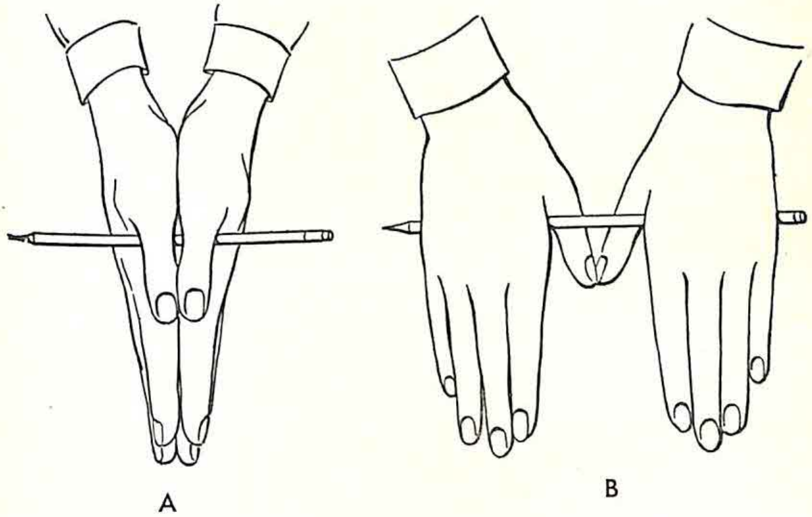

FIG. 4: *Trick with a pencil: A, starting position; B, concluding position*

Our illustrations need not be confined to arithmetic. The artist plays his violin because he has worked to master the instrument. The reader enjoys a poem because he has worked to acquire the art of reading poetry. The team really plays the game Saturday afternoon because every member worked to get ready during the early days of the week.

Spontaneous behavior becomes effective through guidance. External influences that bear upon the movement of spontaneous behavior may contribute to its effectiveness. The preceding chapter pointed out that the cultivation of interests extends the curiosity of a person to new knowledge that may become valuable to his development. The chapter gave further illustration in its discussion of imitation. It indicated that there is a type of conscious imitation that is the product of mature interests. These interests we may classify as (1) influences which others supply, and (2) influences which a person supplies for himself.

We may note the first set of influences when the teacher tries to assist pupils to analyze an activity which they have failed to perform in their spontaneous attempts. Learning the following trick of juggling a pencil may illustrate both the type of influence and the necessity for a combination of analysis with imitation.

The trick is to place the pencil between the bases of the thumbs and the hands, as shown in *A*, and, without separating the hands, to shift to the position shown in *B;* or to start with position *B* and, without removing either hand from the pencil, to shift to position *A*.

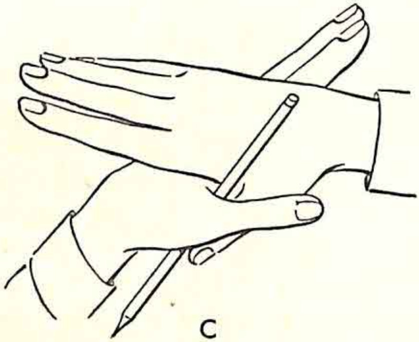

FIG. 5: *Trick with a pencil: C, intermediate position*

Performing the trick in the presence of the pupil stimulates the tendency to imitate. He tries to imitate, but fails. He will continue to fail, unless he hits upon the right method by accident or receives help in discovering the right method. Help is in the nature of an analysis of the whole movement in going from *A* to *B* or in going from *B* to *A*. This analysis the teacher may stimulate by directing the pupil's attention to the intermediate position that is shown in *C*. When the teacher succeeds in directing attention to position *C*, and when the pupil substitutes attention to position *C* for his spontaneous tendency to imitate the whole movement, he easily learns to perform the trick.

Much more complex and difficult are the analyses the pupil must make in the social arts and social modes of thinking, analyses which he should learn in school and which he otherwise is content to imitate in a superficial way. The need for analysis in learning the simple trick of pencil juggling indicates the importance of giving attention to analyses in the learning situations of the school. As the pupil progresses, he may learn something about how to make analyses independently of the teacher. To the extent that he does, he gains the ability to direct his own attention. Whether he is independent of the teacher or must depend upon the teacher's guidance, he must employ the activity of work in the conscious effort to fix and hold attention upon the task at hand.

The second set of influences are not greatly unlike the first in the results they produce. They operate in the conscious tendency to copy the actions of another. In this case, the individual deliberately chooses to imitate a model. At one extreme his imitation may take the form of hero worship. At the other, it may center upon the advantages that seem to accrue from the activities of another and that are quite apart from the personality of the other person. In either case, there is a deliberate analysis of the activities and performances of the imitated person. The imitating person studies what the other does and has done, and consciously tries to pattern his own doings after them. A common illustration is that of the beginner in a business or profession who chooses to pattern after an older person who has gained a marked degree of success in the calling. Often the younger individual gains much help in launching his career from his analysis of the successful career of an older person and from his conscious attempts to imitate.

Summary. The movement of behavior is determined by the direction it takes. The direction of behavior is determined by what attracts or guides it. At first, the allurements are the externals of surrounding situations. Finally, they may be the internals. Thus, educational progress may be measured in terms of the development of attention as it progresses from attraction by appearances to attraction by actualities.

Since actualities do not lie upon the surfaces of things, but are the meanings discoverable by insight beneath the surfaces, it follows that there is a necessary intermediate period between the allurement of appearances and the apprehension of actualities. Such is the period of work, of activity controlled by drive, of effortful, voluntary, purposeful endeavor. In passing from the self-generated behavior, whose stimuli are largely sensory, to its counterpart on the higher levels of intellectual play, whose stimuli are largely ideational, the guided, directed, controlled activity of seeking after and finding meanings is an absolute necessity. There is no royal road to learning, and only the worker himself can raise his work to the level of intellectual play. This high level of achievement is always a sufficient reward for such hardships as must be endured in reaching it.

Chapter 5

Impulsive Behavior

Purpose of the chapter. A preceding chapter has shown that the impulsive tendencies of curiosity, imitation, and play are of great significance. It has pointed out that the positive direction of these tendencies may be a means of starting children on the road toward systematic learning. The present chapter, too, refers to the presence of impulsive tendencies. Here the discussion indicates them as possible deterrents of systematic learning, and suggests that negative direction is sometimes of value. The discussions of the present chapter consider two main points: (1) the nature of impulsive tendencies, and (2) the modification of impulsive tendencies.

1. The Nature of Impulsive Tendencies

Impulsive behavior seems to be natural. When the child comes to school at the age of six, he brings with him many tendencies toward behavior whose origins are unknown to his teachers. He acts as do the children of his age—naturally, as it seems to his teachers. Yet his teachers are not aware of his previous experiences. They discount the influences of his social contacts up to the time of his enrollment in school. They often consider him a "creature of his instincts." They unwittingly use the terms "instinct" and "instinctive" to cover their lack of knowledge of the course and extent of the pupil's previous training.

An instinct is a complex of reflex activities. It acts, as does a yawn which when started continues to its end, as a chain of reflexes, each producing the stimulation that sets off the one that succeeds. It is a tendency to behavior that does not have to be learned before it can be employed. An instinct is like a habit in the sense that both are automatic. Unlike a habit, which is acquired, an instinct is natural and unlearned.

Many tendencies toward behavior that once were considered natural have been found actually to be acquired. As we learn more and more about the earlier years of childhood, we discover more and more that one "instinct" after another is really a pattern of behavior that experience has developed. We become more and more aware that the child of six is a social creature, first, last, and all the time, however unsocial and "natural" the social standards of the world of adults seem to reveal him. Measured by adult standards, the child of six is unsocial and impulsive. As he appears against the background of his earlier years of growth and development, he shows up to be a creature of the environment which his parents or guardians have provided and conditioned for him. The basis of impulses may be hereditary, but their development is environmental.

The term "instinctive" has been too long in the vocabulary of teachers. If, through the influence of habit, teachers must use the term, they should take caution to use it with reservation. They had better substitute the term "impulsive" and recognize the social character of the so-called and apparently "natural" impulses.

Impulsive tendencies are products of training. If the studies of infant behavior had nothing to offer in explanation of the impulses of children when they first enter school, the experiences of teachers with children from grade to grade ought of themselves to suggest the idea that impulses are more than natural tendencies. Let the teacher of one of the later grades consider the character of the impulses of his pupils and trace some of them to their points of origin. He will discover that the impulses, good and bad, have their explanations in large measure in the kinds of training and lapses of training earlier grades have provided. Here is a pupil who is impulsively eager, interested, courteous, respectful; here is another who is impulsively inattentive, disturbing, selfish, scatterbrained. The teacher can with little difficulty put his finger on the school grades or the school experiences which through the earlier years of the training of his pupils produced the good and the bad impulses.

One reason why impulses seem to be natural instincts is that they have become intertwined in the pupil's personality. They are, as it were, the pupil's individuality. They are sometimes antisocial in character. Being individualistic, sometimes antisocial, they appear to be natural and instinctive. We should recall that though training is social, it may be so narrowly social as actually to be antisocial.

The environmental character of impulses is a matter of great importance. We may see it clearly in the administration of the school program. We may not see it as clearly in the incidental learning activities of the pupil's earlier years. Its importance at the earlier levels is not thereby reduced; rather, if anything, it is increased.

The concept of instinctive behavior is misleading. Instinct is not a useful concept for education. In the first place, the concept reinfluences the teacher toward the attitude of complacency as regards the origin of the impulses of his pupils. It covers up in an apparent explanation his ignorance of the development of the impulses his pupils already possess. It dulls his ideas about the possibility of controlling the development of the impulses his pupils may manifest in later grades. Also, the concept predisposes the teacher toward a "natural" form of education. It suggests education as a kind of superstructure that must be made to fit upon a "natural" foundation over the shaping of which society and the school have little control. Thus it minimizes the importance of a planned system of education as a controlling force in the development of the behavior tendencies of pupils. Much of the so-called "education" the school provides that is pointless, aimless, confusing, unplanned, inspired by immediate whims of pupils, and filled with any and all sorts of "activities" that present "interests" and everyday "experiences" suggest, is the direct result of the view that impulses are "natural instincts" and, consequently, the "natural basis of education." This is the reason why many teachers think it wise to put themselves and what they should teach "in the background" and to determine what the pupils should learn from the so-called "learning situations" which seem "natural" because they are outgrowths of the "natural" behavior tendencies of pupils. This is the reason why many teachers are in a state of uncertainty about the conflicting demands of education as "natural growth" on the one hand and education as a social force on the other. To state the matter perhaps more correctly, this is the reason why not a few teachers are very clear in their own minds that "education" must be what the "natural" tendencies of individual pupils seem to suggest.

The concept of impulsive behavior suggests the possibility of guidance. The concept of impulse breaks away from the "instinct" explanation of behavior tendencies. This concept springs from the fact that children and their personalities are as social contacts and experiences, broad or narrow, guided or accidental, have made them. It suggests that since present impulses are in the main the result of training, they may develop and be modified through further training. It suggests that the earlier years of the school should assume a great deal of responsibility for the impulses and enthusiasms of pupils during the later years. It suggests that the school must sometimes set its hand to the task of correcting the educational errors of other educational agencies.

Teachers ought to recognize the presence of impulsive tendencies among their pupils. This does not suggest that teachers should try to stamp out the tendencies, on the one hand, or to allow them full play, on the other. It means that they should try to chart the course of education toward the control of impulsive tendencies. Teachers must undertake to modify impulsive tendencies and give them a new direction. An earlier chapter, which dealt with the impulses of curiosity, imitation, and play, indicated that the school could use these impulses as means of education only through intelligent direction. The chapter pointed out that only through modification in the sense of development could such impulses serve the purposes of the school. The succeeding section of the present chapter suggests that many of the impulsive tendencies of pupils are inimical to education. Here, again, the modification of impulsive tendencies is the subject of explicit discussion.

Summary. Pupils usually behave as we expect them to behave. Their behavior is an immediate and present fact. The causes are usually hidden in a remote and forgotten past. Unmindful of causes and impressed by present facts, we are inclined to consider expected behavior as natural in origin.

Children and youth, instead of being creatures of instinct, are rather creatures of the environment in which they have grown. Society has had charge of their growth and has produced the tendencies toward behavior which they exhibit. The school as an agency of society is not called upon to pattern itself after the behavior tendencies of its pupils. The function of the school is rather the responsible one of taking charge of the behavior tendencies its pupils exhibit and of shaping these tendencies toward social ends.

The concept of instinct seems useful as a cover for ignorance of the way behavior tendencies originate. The concept is not useful as a means of revealing the responsibility of the school to guide and shape behavior tendencies.

2. The Modification of Impulsive Tendencies

There are three important ways of modifying impulsive tendencies toward behavior: (1) by repression, (2) by substitution, and (3) by redirection.

A. Modification by Repression

Punishment is an instrument of control. Through punishment the object of desire takes on an unpleasant and repelling quality that it does not otherwise possess. Punishment produces a reaction of attitude and meaning that remains long after the punishment itself may be forgotten. The quality, or the reaction, attaches to the desire, and neutralizes its attractiveness. In this manner, punishment serves as an instrument of control.

When the child's parent punishes him for taking a forbidden object, the punishment produces a feeling of displeasure which is a part of the total experience gained from taking the object. Later, when the same temptation arises, its influence is less than at first, because the anticipated satisfaction that the forbidden object seems to offer has been lessened. Still later, all such anticipated satisfaction may have vanished and in its place there may be substituted a feeling of repulsion.

Perhaps as much depends upon how the punishment is administered as upon the punishment itself. When the thoughtful parent administers punishment for the appropriation of a forbidden object, he makes as clear as he can that he is punishing not because the object is bad, but because taking forbidden things is bad. He attempts to help his child to attach the punishment to the idea of "forbidden" or "not mine" or "belongs to somebody else," and not primarily to the particular object. He is careful to make clear the reason for the punishment he is about to administer. In short, he administers punishment as a means of impressing a reason. Likewise, the thoughtful teacher tries to help the pupil to connect the punishment with the misdemeanor. He does not keep the pupil in at recess to study a lesson lest the pupil may be inclined to associate the punishment of missing recess with studying a lesson.

Annoyance is a more effective stimulus than satisfaction. For the repression of impulsive tendencies that are antisocial, punishment is a more effective means of control than is the satisfying of tendencies that take the opposite direction. This is not to say that the careful parent and teacher should not take advantage of every means to encourage the development of the social tendencies toward good behavior. Though rewards for good behavior may cause the child to substitute good behavior for that which is not good, they are often inadequate as a means of controlling the expression of unfavorable tendencies that are deep-seated. Unfavorable tendencies are always present, and the idea of missing a reward is not always a deterrent. The provision of annoyance to be attached to the expression of deep-seated unfavorable tendencies is an effective method of control, especially among young children. Later, as they learn through experience the superior advantage of good behavior, they may be influenced more by ideas and less by external controls. Yet the proper use of external controls makes the ideas impressive and encourages their development.

Social disapproval is an effective form of punishment. Although physical punishment that applies immediately to the offense is an effective deterrent among young children, another form of punishment can very quickly become a more impressive means of control. This is the punishment of social disapproval which appears as a form of social resentment whenever an established social custom or an established social expectation has been violated. To understand the value of social disapproval, we should distinguish the real from the artificial.

Real social disapproval is involuntary and impersonal. It follows in the natural course of events the breach of an established usage. It does not need personal discretion to bring it to pass. It happens of its own accord without regard to the individual who may be involved. And, more important than anything else, it is accepted by the one upon whom it is inflicted as an inevitable natural result of his own mistaken actions.

The artificial type of social disapproval attaches less to the activity and more to the individual. It is a matter of decision, of personal animus. It is made up on the spur of the moment to fit the particular occasion, and it is directed against a particular individual. Not being derived from the reactions that follow the breach of an established custom, it is not accepted by the one upon whom it is inflicted as a deserved result of his actions.

The following illustrations may help to make clear the difference between real and artificial social disapproval. In one classroom, the teacher carefully plans the work in advance and with few exceptions grades it to meet the abilities of the students. The teacher seems always to be very sure of himself and to be in control of the whole classroom situation. He is quiet, courteous, and firm; and his courteous manner and air of mastery invite, and seem to require, equal courtesy from his students. As a consequence, his students, without being aware of it, are drilled day after day in the practice of courtesy. Courtesy thus becomes the expected practice in this classroom. The expectation of courtesy develops as courtesy develops.

The classroom of another teacher presents a highly contrasting situation. Here, the work is unplanned; the assignments are either too easy or too hard; and the teacher is not sure of himself or of what he should expect from his students. He tries to be quiet, courteous, and firm; but his uncertainty transfers to his contacts and communications with his students. They are inclined to be loud and boisterous. In this classroom, they neither learn courtesy nor acquire the expectation that courtesy will prevail.

Now, let us imagine an identical situation arising in the two classrooms, supposing that an identical situation would be at all possible. Through exuberance of spirit, combined with impatience with a task being undertaken, a student in each classroom forgets himself so far as to reply to the teacher's question or direction with a loud and boisterous remark that gives the appearance of direct discourtesy. In the one classroom, the expectation that is the common possession of all is violated; and social disapproval, though perhaps not overtly expressed, is the natural and inevitable result. Indeed, the offending student disapproves of himself. In the other classroom, no expectation is violated; and there is no natural disapproval that results inevitably from the student's offense. The teacher disapproves, but that is personal. Suppose he calls upon the class for their disapproval, and they are inclined to give it. That also is personal; and everyone on sober second thought would so recognize it. The offending student, without such second thought, so recognizes it at once. Instead of being corrected, he is offended and made resentful, and rightly so.

The conclusion we may draw is that social disapproval, to be effective, must not be a product manufactured to fit the case it is intended to correct, but that it must be a by-product that comes of itself from an expectation that is violated. Though real social disapproval is repressive, it is the product of a positive program.

Natural punishments are too severe. It is sometimes argued that nature itself will provide effective punishment for all offenses one may commit, and that parents, teachers, and society in general should therefore refrain from administering punishment. It is true that natural punishment is inevitable, though sometimes slow in coming; and it is true that the growing child learns much from the inevitability of natural punishment. It is, however, to the individual's advantage if he can be prevented from committing certain offenses that follow from his impulsive tendencies, even at the cost of sharp discomfort, and thus escape the punishment that nature inflicts. The reasons are (1) that natural punishments are generally not a deterrent to impulsive behavior, because they are not experienced in advance, and (2) that natural punishments are generally very severe. For example, it will be much to the advantage of a child who is inclined to play too near a fire if an older person causes him to move a safe distance away, though punishment is required in the effort. Whatever the severity of the punishment the older person is forced to administer, it will not be as severe as that which nature will mete out should the child fall into the fire. Necessary punishment, whether physical or that of social disapproval, is always more humane than is the neglect which allows the immature to commit offenses that nature will punish. Wise guidance seeks to help the immature to escape the punishments which nature inflicts by keeping them from committing the offenses that lead to such punishments.

B. *Modification by Substitution*

Expression according to rules must be learned. When an individual learns better ways of giving expression to his impulsive tendencies, they modify to his advantage and to that of his social group. To illustrate, we may consider appropriate ways of giving expression to the tendencies of rivalry and competition.

Rivalry and competition appear whenever two or more individuals strive to attain the same end. They are expressions of the individualistic tendency toward self-advancement. Having the tendency uncurbed, a person seeks to advance his interest at the expense of another. He pulls others back in order to push himself ahead. He engenders animosity and enmity. Having the tendency under control, the person regards the interests of others while he is trying to advance his own. He develops sympathy for the aspirations of others. He engenders feelings of wholesome respect and of friendliness for his contenders. Progress from the stage of uncurbed activity to the stage of control is in proportion to the shift a person can make from interest in the desirability of the end to be attained to interest in the desirability of attaining the end by approved methods. The good sportsman is less interested in winning the goal than in winning it in accordance with the rules of the game. His interest in playing the game according to rule makes reaching the goal a desirable end.

There is little about most of the goals of competitive endeavor that influences the control of conduct. Such desirability as may be inherent in them does not suggest the control of actions in reaching them. It is the rules, the way to play the game, that shape conduct. This is so because the game itself is the game of following the rules. The rules, which specify the things the player may do, how he may do them, and what he must refrain from doing, are the major interest, and, hence, the controlling interest. As the player learns the rules and the ways of conforming to the rules, he learns in similar measure to neglect personalities, self-interest, and personal feeling against the endeavors of others. He learns to express his tendencies according to rules, and in this manner learns to substitute better ways of expression.

Sporadic rules do not impress. One of the reasons why vacant-lot baseball, which younger boys play, is often less baseball than bickerings, quarrels, and personal combats is that the boys make the rules as the game proceeds. There is no complete set of rules that all understand and all try to follow. Some rules they understand. These serve as good controls of conduct. Some rules they try to make up to apply to specific details of the game. Rules of the first type occasion no quarrels. Everyone accepts them as the standards and guides of conduct. Rules of the latter type encourage misunderstanding and instability of conduct. They give to the players opportunity to seek personal advantage for themselves and disadvantage for others. Sporadic rules do not help anyone to substitute better ways of giving expression to the tendencies of rivalry and competition.

Application of rules should be impersonal. The chief fault of sporadic rules is that participants make and invoke them to turn the special happenings of the total activity to personal advantage. For example, when a batter knocks the ball over the fence, his opponents make the rule, "over the fence is out." It is obvious to the batter and to his teammates that the rule covers this particular feature of the game to their own disadvantage, but it is not so clear that the rule covers all similar features during the rest of the game. Since the rest of the game is not immediately present in consciousness, they consider the invocation of the rule as one-sided and bearing against them personally. The rule at the moment helps the other side only; it is a disadvantage to their team. It is a rule, therefore, that does not command their respect.

For a rule to command respect it must be one that applies itself more or less automatically. It must be one that all accept as being inherent in the game, or activity, or situation, and beyond the tampering of any individual. Such a rule is inflexible. No one can bend it to suit special occurrences or personal whims. It is beyond anyone's control. It, therefore, is a means of control. When one's play, or skill, or tendency toward behavior, does not square with such a rule, the suggestion that results is "modify behavior to fit the rule," not "change the rule to fit the behavior." Such a rule is a powerful force in inducing an individual to bring his individual tendencies under control.

Inherent rules occur only in systematically planned and going concerns. In the school, as in a game, the acceptance of rules as standards and controls of behavior depends upon the inherency of the rules. If, as already suggested, the participants make them to suit particular occasions that arise, the rules have no influence of their own and only such force as the individual in charge can bring to bear out of his own personality. If, on the other hand, the participants consider the rules as part of the total situation, the rules are impersonal and carry a force of their own that is entirely dissociated from the personality of the individual in charge. Rules of the latter sort carry in themselves an expectation that all will observe them. This expectation, like all others, is a motive force and a control.

In most games, which differ of course from the vacant-lot baseball of small boys, the rules of conduct are part of the game. The game, even with its first introduction, is an established activity, because it is an enterprise carefully planned in advance. In learning the game, a person sets out to understand the rules with a determination to observe them himself and to insist that others who participate give equal observance. Likewise, in the well-ordered school, the rules of conduct and activity are a part of the total situation. The new pupil is inclined to conform to what is required. Is it the rule to be in his seat at nine o'clock? Is it the rule to go about a task promptly? Is it the rule to do his best to find answers for himself, and not to copy the answers others have discovered? Is it the rule to take his turn in a play activity? Is it the rule to be quiet in the library? Is it the rule to practice a drill exercise until the teacher says "stop"? Whatever the rule, if it is in the established order of things, the pupil accepts it as part of the total situation, as part of the game. He is equally willing to conform to the rules of the school and to the rules of a game. The only prerequisite is that the rules are in operation without regard to his own presence or absence.

For rules in the school to operate as motives and controls, they must exist as characteristic features of the school. If the exercises and the activities of the school are largely incidental and do not follow any set order; if the teacher adopts them on the spur of the moment; if they are merely phases of the passing situations; if the passing interests and whims of the pupils determine them—though the exercises and activities may be characteristic of that kind of school, they do not impress the pupils as rules to observe and respect. On the other hand, if the exercises and activities appear as a continuity with each one leading to and suggesting the next, and if all are part of the day-by-day schedule, they build up within themselves an expectation that becomes more effective as the days pass. The pupil finds that he can anticipate what is going to happen or what he should do next. The plan of activities the teacher has prepared for him appears as an established thing with a rigidity that gives little opportunity for the gratification of his passing whims. The plan, as it unfolds, assumes an importance in its own right. Though the teacher made it, it becomes for the pupil a thing apart from and outside the personality of the teacher. It appears to the pupil that what the plan suggests he must try to do. That is the rule. He is there to play the game as the game itself seems to expect him to play it.

3. *Modification by Redirection*

Feelings must take new associations. When an impulsive tendency expresses itself in behavior, part of the total experience is the feeling that accompanies the behavior. Since the tendency is personal and is a part of the individual's developed personality, the feeling accompanying the expression of the tendency is naturally one of satisfaction. Often the feeling is one of exhilaration. The modification of this feeling plays an important part in the modification of the tendency.

One of the ways to modify impulsive tendencies is to influence behavior by giving a new direction to the bodily feelings that accompany it. Thus, if a feeling of satisfaction can be withdrawn from its natural setting and related to another type of behavior, it can be made to encourage the new type of behavior to which it becomes attached. The impulse to fight when provoked, or the tendency to resent an abuse, may be a means of illustration.

When a person's rights are invaded by another, he tends to resent the act, to defend his rights, and to avenge the insult by punishing the invader. Expression of the tendency, if successful, results in a feeling of satisfaction. Now, if the person learns to attach this feeling to a less primitive method of standing up for his rights, he will move toward results that are less antisocial and in the long run more satisfying. He does not need to stamp out the tendency to fight in resentment of a wrong. He will still resent an offense, but he will be satisfied to manifest resentment in a civilized manner rather than by primitive means. He may attach this feeling of satisfaction to a whole new series of offenses. He can learn to resent offenses against weaker individuals than himself and those against society. By so doing he can disregard many of the more trivial offenses that operate against his own person.

New associations must seem worth while. Through the transfer of feeling to better types of behavior, a person's tendency to engage in primitive fighting changes to the tendency to fight in defense of a cause or of a principle. This is a gradual development, yet youth may achieve it at least in part. A youth may develop a code of honor that he is willing to stand for and fight for by methods very different from physical combat. For example, a youth may consider it a weakness or a matter of dishonor to report a misdemeanor of another, and refuse to bear testimony against him. Yet the same youth may consider it a matter of honor to report his own mistakes and misdemeanors, and report them even in the face of certain and serious punishment. He is seeking to defend or to fight for the ideas and the principles which he considers things of value. Youth can fight for a cause, when it is his cause, when to him the cause is worth defending.

Slogans are effective in redirecting impulsive tendencies. The use of slogans that originally attached to primitive tendencies and their modes of expression is an effective means of stimulating new attachments. These new attachments and the slogans which express them confuse no one. In the cheering section in the grand-stand the excited partisans sing a "fighting" song or give a "fighting" yell, and they admonish the players to "fight." The Boy Scout movement uses the feelings that are connected with primitive tendencies to stimulate worthy action. In this same sense the Salvation Army is a militant organization.

Summary. Youth in the school exhibit many tendencies toward behavior that are individualistic and antisocial. The school cannot afford to ignore these tendencies. This does not mean, on the one hand, that the school should encourage their unbridled expression, nor, on the other, that the school should seek to stamp them out. It suggests that the school should use every appropriate means to help youth to bring their impulsive tendencies under control.

There are three important ways to modify impulsive tendencies:

A. MODIFICATION BY REPRESSION

1. Punishment is an instrument of control.
2. Annoyance is a more effective stimulus than satisfaction.
3. Social disapproval is an effective form of punishment.
4. Natural punishments are too severe.

B. MODIFICATION BY SUBSTITUTION

1. Expression according to rules must be learned.
2. Sporadic rules do not impress.
3. Application of rules should be impersonal.
4. Inherent rules occur only in systematically planned and going concerns.

C. MODIFICATION BY REDIRECTION

1. Feelings must take new associations.
2. New associations must seem worth while.
3. Slogans are effective in redirecting impulsive tendencies.

Chapter 6

Habitual Behavior

Purpose of the chapter. There is a pleasing fiction current in our schools to the effect that the behavior of a pupil at any given moment is determined by the kind of learning situation the teacher has set up for the occasion; that the mistakes and failures of one grade may be corrected in the next; and that a good school in the later years can be provided without much regard for what has gone on in the earlier years. The counterpart of this fiction appears in the attitudes of many persons outside the school. One is constantly lulled into a false sense of satisfaction by the thought that whenever he wishes he can turn over a new leaf; that tomorrow is always a new day; and that under the more propitious circumstances of the future he can take on more successful modes of behavior than those he now practices.

The truth of the matter is, however, quite to the contrary. Pupils behave today much as they behaved yesterday. The mistakes and failures of one grade move on to and pile up in the next. Whether the school in the later years is good or poor depends upon the type of school that existed in the earlier years. The leaf we turn tomorrow is never a blank page. The failures and successes of today have left their imprint upon it. Past and present behavior colors behavior in the future, either favorably or unfavorably. So important are the behavior tendencies from past experience that it becomes a major concern of the school to set the stage for successful behavior in the future through the cultivation of appropriate tendencies in the course of its day-to-day activities.

The preceding chapter presented a treatment of those impulsive tendencies that are a possible deterrent of systematic learning, and discussed their presence as a problem which the school must face and try to solve. The present chapter carries the discussion to the behavior tendencies that are acquired or habitual. Here the theme is the necessity of developing appropriate tendencies as products of systematic learning, and the problem is the determination of a method by which they can be developed. The discussion of the present chapter is in consideration of two main points: (1) the nature and importance of habit, and (2) rules for habit formation.

1. The Nature and Importance of Habit

Habits are tendencies toward behavior. The stimulus of any given situation in which a person finds himself causes the release of nervous energy to provide for his response or his adjustment to the situation. The nervous energy thus released travels out and discharges itself over certain pathways that are set up in the nervous system. There are many possible pathways. Which ones the released nervous energy follows are determined by the relative amounts of resistance they provide. The purely physiological explanation of behavior is that nervous energy travels over those pathways of discharge that provide the least resistance.

At birth, the many possible pathways offer about equal resistance. There are few paths of preferred conduction. The paths at the outset are more or less accidental insofar as the child is concerned. They may be a matter of choice insofar as his parents, nurse, and teacher are concerned. With the passage of time the paths of preferred conduction increase in number. Those that arise through natural growth or through inheritance are reflexive. Those that result from experience and training are habits.

A pathway of conduction becomes a preferred one through use. Once nervous energy flows over a given pathway, its tendency afterward is to take the same pathway. The reason is, to follow the physiological explanation, that the use of a given pathway diminishes its resistance. Or, to change the figure, each succeeding discharge of nervous energy that results from a given stimulus cuts the pathway deeper than it was before. As an automobile each time it travels over a dirt road deepens the tracks and increases the difficulty of getting out of the ruts, so does a given discharge of nervous energy wear away its path and find it more difficult to follow a new one.

The physiological explanation is merely an explanation and not an entirely satisfactory one. In the first place, it sounds like a statement of fact though it is merely a statement of opinion. It appears to carry more weight than it actually is known to possess. Secondly, neurologists have made no discoveries which provide a factual basis for the explanation. Finally, it explains motor habits only, not ideational and emotional habits. We use the explanation for the lack of a better one.

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Habits are general patterns of behavior. Any habit, however simple it may seem when compared with those that are more complex, is more than a simple motor response to a sensory stimulation. Even the writing of a single, simple letter of the alphabet involves a delicate muscular coordination, as a later chapter will make clear. This muscular coordination is only the objective expression of a total bodily response. The total response includes the idea—the perception, both visual and muscular—of writing the letter. It involves the selecting and making of many adjustments. Writing with a pen or pencil on paper requires different adjustments from those required for writing with chalk on the blackboard. The writing also relates to the writer's attitude at the moment. The quality of writing is not the same when a person is writing a letter to a friend and when he is making notes for his own use.

The motor responses of a given habit may be quite variable without any consequent modification of the habit itself. To illustrate, the smoker may have the habit of reaching for his pipe whenever he sits in his easy chair to read. He himself, the chair, and the location of the pipe are never in exactly the same relation to each other. At one time the smoker must reach a certain distance in one direction, and the next time he must reach a different distance in another direction. Or he may reach with one hand or the other, depending upon which one is not engaged with his book. Again, let us say a person has the habit of neatness. His motor responses are controlled by his idea of what neatness requires and by the occasions that seem to require neatness. He needs different sets of motor responses to arrange the papers on his desk and the books on his table. He needs a different set of responses to knot his tie, responses conditioned by the kind of tie he chooses to wear.

A habit is therefore a kind of general pattern of behavior—a sort of blueprint made up of many details that require detailed adjustments. It is the given pattern that is habitual, not necessarily any one given response that a particular occasion requires to fit the pattern. In dressing, for example, a person does not always find his clothes in the same spot. Yet he may dress according to a given habitual pattern, first one sock, then the other, one shoe, then the next. He follows his pattern whether he must reach for the articles in their usual places in the wardrobe at home, in a chance location in a suitcase in his hotel room, or suspended from a tent rope in camp. His whole complexity of tendencies—combined into a given pattern of ideas, attitudes, perceptions—calls for adjustments, motor and otherwise, to fit a given general situation. His habit is the bent, the persistent tendency, of his whole personality in a given direction or toward a given end.

The term "skill" is a frequent substitute for the term "habit." A skill is a habitual mode of response. It is generally motor, not ideational, although we sometimes say that the pupil has gained "skill" in reading, has mastered the "skills" in computation, and so on. Statements like these usually limit the apprehension of such activities as reading and computation to the mechanical or objective phases, and they serve to push into the background the phases of comprehension and understanding. The term "skillful" is broader in its application than the term "skill." We may speak of the "skillful reader," for example, without limiting our attention to the purely mechanical phases of reading. The term "habit" denotes total pattern, and the term "skill" indicates expertness in performance. Thus, for example, the tennis player may have the habit of serving in a certain way, but he may exhibit little skill in his manner of serving.

Habits may be simple or complex. A habit may be a simple behavior pattern or it may be a complex one. The golfer, for example, may habitually interlock the fingers of his two hands in grasping his club, whereas his habitual mode of driving is the combination and coordination of many minor habitual tendencies and actions. In the learning of a school subject, proficiency comes not alone through the formation of many minor habits, but through their coordination into what we may call "hierarchies of habits."

The simpler and earlier habits of a hierarchy may or may not add to the efficiency of the more complex and later ones. The efficiency of the later habits depends in part upon the efficiency of the earlier ones. It depends, too, upon the individual's attitude toward and understanding of the situation for which the habits in question are appropriate.

The following illustration may help to make the matter clear. Books on pedagogy frequently advise teachers to prevent pupils in beginning arithmetic from counting the numbers to be added on their fingers, saying that the pupils will tend to carry the practice to later and more difficult addition where counting on the fingers is not only a very primitive way of adding but also a very inefficient way. There are always enough pupils using the finger method in later arithmetic to seem to prove the point. On the other hand, when a person examines these pupils closely, he finds that they persist in their earlier practice largely because they have never learned newer and more appropriate methods of adding to apply to the more complex processes of addition. He finds also that the pupils who are successful in arithmetic have learned to view the newer and more complex processes of addition, though related to earlier processes, as calling for different methods of adding. The successful pupil may have counted on his fingers to find the answer to two plus three, but he views the addition of six and eight as one that requires an answer in the teens and he has learned to find the answer by grouping six and eight into a *ten* and four more. In consequence, he no longer uses finger counting. For his new additions, he uses a new way of grouping. Then too, his earlier habit of counting on his fingers to add two and three is quickly superseded by the habit of immediate response of five. The earlier habit becomes a kind of steppingstone to the later one. The one habit met an earlier need; the other meets a later need. In similar manner, the habit of walking as a means of transportation does not interfere with the habit of automobile driving as another means of transportation.

The expression of habits is pleasurable. As habits develop, their expression produces feelings of satisfaction. These are immediate results and in no way related to the ultimate results of the behavior in question, whether pleasurable or otherwise.

In the thrill of his successful performance the skillful performer forgets the long and tedious hours of practice he had to endure to acquire his skill. The golfer is thrilled by his long and accurate drive, the basketball player by the goal he has made, the pianist by his mastery of a difficult selection, the typist by his accurate speed, and the pupil by his success in reading, or in squaring up a board, or in solving problems in arithmetic. There is likewise a thrill of satisfaction in promptness, in industry, and in doing honest work, for the individual who has acquired the habits of promptness, industry, and honesty.

The preceding chapter referred to expectation. Expectation is the conscious counterpart of habit. Though a habit becomes less in need of conscious effort and direction as practice makes it more facile, there always is dormant in consciousness the expectation that behavior will continue as it has been. The displeasure that accompanies the violation of this expectation is a negative indication of the satisfaction that accompanies its observance. To illustrate, a feeling of displeasure is produced by the violation of the expectation that drivers on the road will turn to the right in passing. Again, the prompt individual feels dissatisfaction with himself when, through circumstances over which he has no control, he is forced to be late to an engagement.

Habits are more than objective responses. Not only does feeling attach to the expression or performance of a habit; it is engrained in the habitual pattern itself. Habit thus has its inner feeling constituency as well as its outer motor manifestation. There are habitual feelings, attitudes, moods, just as there are habitual actions. Indeed, it is frequently the internal emotional coloring that determines the external expression.

Habits are intellectual as well as emotional. Intellectual patterns of behavior condition and determine the character of responses in specific instances. Intellectual habits differ from individual to individual. One has acquired the habit of industry; another, the habit of idleness. One has acquired the habit of application to the task he should do; another, the habit of procrastination or the habit of mind-wandering. Habits of study among students in school and college are widely different.

The study habits of students profoundly affect the results of their efforts. These habits are cultivated by the training the school administers. They are both the determiners of training and the products of training.

Habitual behavior may be very economical of time and energy. The fact that habitual behavior is performed with ease and with a minimum of conscious effort indicates how it may be a saver of time and energy. The day's work, however varied it may be from day to day, requires many activities, procedures, methods of attack, attitudes, and the like that are useful and necessary in the work of every other day. Now, if we must re-think these ways of behaving and re-adopt them with each new day, we must consume much time and energy entirely apart from the day's work itself. If, on the other hand, we make them all into habits, we can adapt them into the details of each day's work with a minimal expenditure of time and effort. What we in consequence save in time and energy we can devote to the performance of the new tasks and the solving of the new problems that the new day's work brings forth. The person who has made habitual his usual day-by-day activities has a mind that is free to consider the new problems of each day.

Habitual behavior may limit the individual's development. As good habits aid, so bad habits limit, the individual's development. In the work of the school we find ample illustration of the effect of bad habits. Many otherwise brilliant youth are only mediocre students with poor scholastic records. This is because they did not form good habits of study in their earlier years, but formed habits of idleness and inattention. Many an industrious worker in the various professions has been handicapped for years because he was unfortunate enough in his youth to form habits of slow and labored reading. Many students in high school start wrong in one or another of their classes, and in all of their subsequent lessons tend to follow the ineffectual ways that characterized their beginning lessons. There are many students in high school who find it difficult to settle down to any of their work, even that which interests them most. The reason is that they are the victims of such disorderly habits as idleness, mind-wandering, inattention, and unsystematic work—habits which they fastened upon themselves while they were pupils in poorly managed elementary grades. A person who avoids making a habit of consuming time with nonessential, distracting, and useless activities will not be handicapped by this bad habit in his later efforts.

Summary. Habits are highly developed general patterns of behavior that involve the whole of a person's behavior. Their expression in overt acts of behavior appears to be largely motor or physical. Back of the physical manifestations are emotional, perceptual, and ideational patterns which guide and control the adjustments needed, physical and otherwise. Habits are timesavers and energy conservers. They provide the freedom needed by the person who undertakes to raise his behavior to higher levels. But habits do not guarantee such progress. They may also serve to fix and to congeal behavior—both its outer manifestations and its inner controls—on relatively low planes. We may forge habits as chains to give traction to the wheels of our progress or we may allow them to become as brakes to retard our forward movement.

2. Rules for Habit Formation

Good habits need a good beginning. The teacher who provides a good beginning for the work of his school keeps opportunities for disorder from arising and increases the possibilities of promoting good work among his pupils during succeeding days and weeks. He should begin the first day as though the work of the school were a most important business. He should make up the roll with a snap. He should seat the pupils at once in a predetermined order. He should have materials and books at hand for the use of his pupils. He should make assignments at once. He should set everybody to work without delay. If he does these things and others that belong with them, he launches among his pupils the expectation that the next day and the next will likewise begin and continue as important school business. He starts the forces of the positive expectation of good and appropriate behavior to operate and to grow from the very beginning.

When the teacher starts the school year aright, he centers the consciousness of his pupils, at the time it is most amenable to external control, upon the activities they should perform at the outset and make habitual during the course of the year. In similar fashion, if any person desires to start the development of a habit, he should plan to start as correctly and effectively as possible with full consciousness of what he wants to accomplish and with definite understanding of how he means to proceed. Suppose a student wishes to develop more effective study habits. He should make a plan for study that fits the time he has into a well-worked-out routine. He should arrange times for beginning and times for quitting. He should provide a place for study that is as free from distractions as possible. He should arrange a schedule of what he has to do in one-two-three order. He should surround himself with the appropriate materials for study. The way to begin his new routine is to begin.

Activity should continue without exceptions. The student should permit no breaks in his new routine. For example, if his plan calls for study from seven until ten each evening, then in spite of all temptations he should study from seven until ten. If his plan calls for looking up the meaning of each new word encountered and the writing of its definition in his own words, then in spite of the frequent irksomeness of the task he should drive himself to look up and write the definition of each new word. In similar manner, the teacher who starts the school year right by starting right the first day should permit no exceptions to the work he has so well begun. In spite of temptations of both teacher and pupils to depart from the practices of the first day, the teacher should see that each new day's work moves ahead according to plan and that everyone holds to the schedule. All this seems to make a hard beginning and a difficult course to pursue. Yet soon everyone begins to have and to feel the expectation that the work of this particular school is an important business, and that he should adhere to the business practices of this school.

Attentive practice is important. Practice molds activity into habit. Yet it is not mere practice that produces results. The practice should be attentive. In the formation of a skill, attentive practice counts for more than inattentive practice. Likewise, in the formation of the more general habits, full attention to what one is practicing—that is, full consciousness of the activity itself and of its meaning and importance—makes the practice effective. This is only another way of saying that it is effort that counts in the practice. Indeed, shorter practice periods in which the effort is intense are far more effective in fixing a habit than are longer practice periods in which the effort lags. A person must pay in effort if he wishes to acquire the habits that in the long run will save him effort. To acquire these habits a person must have stimulation and guidance. Either someone else must be the driver or he must drive himself.

Attention to practice may be thought of in another way. One must give attention to every opportunity that is afforded to practice the activity which he would make into habit. To keep his effort alive he must give it daily exercise.

The good school employs many devices to make the practice of the pupils attentive. The following may illustrate.

A teacher in the first grade sought to impress upon the pupils the importance of good posture in standing and in sitting at a desk. To make clear the correct position in sitting, the teacher first demonstrated by having the pupils observe her at her desk. Next, she took considerable pains to get each child to take the correct position, pointing out at the same time a picture on the wall of a boy and a girl sitting erect at their desks. She made frequent reference to those who were learning as "good soldiers." As soon as the pupils had learned how to take the correct position, she attached to it the word of command "Position," and she used the word of command in the drills she conducted. Finally, whenever she deemed it necessary and whenever she noticed any of the pupils slumping or otherwise assuming incorrect positions during the course of their day's activities, she would issue the command "Position" to bring them back to correct posture.

A teacher in the fifth grade, in teaching common denominators in fractions, first made clear by illustration and explanation the necessity of changing fractions of unlike denominators to "parts of the same size" in order to compare or to add or subtract them. Then, as the pupils began their practice, and for a long time thereafter when the pupils had to deal with fractions having unlike denominators, he would call attention to what was required by the question: "Are the parts you have to add (or compare or subtract) of the same size?"

Pupils should learn the rules of habit building. An important aid in habit building is knowledge of the rules. Learning the rules helps to bring the habit to be acquired as well as the activity to be practiced into the field of consciousness. Though the pupil may be too immature to understand fully the importance of the rules or the rules themselves, reference to them aids in the stimulation of effort. Since a certain amount of driving is necessary to form good habits, reference to the rules suggests the possibility to the pupils of undertaking some of the driving themselves. Learning the rules thus brings the incentives of the pupils somewhat into line with the desires of the teacher. As the pupils become older and can assume more responsibility for their actions, knowledge of the rules for habit building serves both as a drive and as a guide in the acquisition of any given habit they may feel the need of developing.

Habits may be steppingstones to better behavior. Perhaps the most important rule to observe in the building of habits is the one which concerns itself with the avoidance of the negative effects of fixed behavior patterns upon the individual's developing adjustments. These negative effects were stated in the preceding section of the chapter. We shall consider here the way out of the difficulty they present.

One way out of the difficulty is the formation of a variety of habits to meet a variety of needs. The reading activities of pupils in school may illustrate the point. Pupil A learned to read slowly and analytically. This was the type of reading activity his teacher encouraged him to practice. Because he formed the habit of slow and laborious reading, he handicapped himself in all of his subsequent schoolwork and he never became a wide reader. Pupil B learned to read rapidly. This was the type of reading activity his teacher encouraged him to practice. As a consequence, he handicapped himself in carrying on the later phases of his schoolwork that required careful, analytical reading. Pupil B became a wide reader, but never a careful reader. Pupil C learned at the outset as did Pupil B. Later, when Pupil C had formed the habit of rapid reading of those materials that should be read rapidly, he learned how to read assimilatively—that is, how to read with the purpose of finding answers to questions and solutions to problems. Still later, he learned how to read appreciatively—that is, how to read and reread a poem or an essay to get the sense of what the writer had written. Pupil C had to practice the three types of reading activity with the three types of materials for which they, respectively, were appropriate. Pupil C, in his later scholastic activities, was an adaptable reader. He became an extensive reader and an intensive reader. He could read rapidly, he could skim in his reading and concentrate upon the points of interest and value, and he could read analytically. No one of his different reading habits interfered with any other. He could adapt his reading practice to the kind of reading material he wished to read or needed to read.

Another way out of the difficulty is the formation of new habits to meet new needs, or the development of patterns of behavior to take care of changing situations. Illustration may be drawn from the work of the school. In the first grade, a teacher showed her pupils how to find answers to such questions as "Two from five is how many?" "Three and two are how many?" and so on, by having the pupils arrange and rearrange the groups indicated and pay attention to the resulting remainders and totals. As the pupils learned this method of working and thinking, they used the method to find their own answers. For some time the exercises continued and they seemed to lead toward a fixed pattern of behavior. Then the teacher showed the pupils how they could find answers by "imagining" or "thinking" the arrangements and rearrangements, rather than by actually making them. The pupils now found answers to their earlier questions by "thinking so many away" or by "thinking two groups together," as the questions required. Here the pattern of behavior was somewhat like the one already learned. Yet it was different. It was a pattern on a slightly higher level. Still later, when this latter pattern had developed sufficiently, the pupils were able to "think" their responses to the questions on a still higher level. They answered questions about the arrangement and rearrangement of objects when no objects were present. For these pupils the development of a behavior pattern did not "freeze" responses at a given level, but rather served as a point of departure for the development of a behavior pattern on a higher level. At every point in the training the teacher made sure that the pupils understood the situations and the new requirements of each situation.

These first-grade pupils avoided the negative effects of fixed behavior patterns by learning to understand the new situation and the new requirements of the situation. They brought their old habit to a new setting. Instead of the old habit inhibiting the adjustment that was needed, the new setting adjusted the old habit to its new requirements. This is the outer picture. The inner picture is that it was the pupils' understanding of the new requirements that worked the change.

Observation of the way people form habits leads to several conclusions. Habit patterns may aid the transition to new adjustments. They may be steppingstones to higher levels of behavior. They do not need to take on an inflexibility which retards development. The secret of new adjustments and of development of more appropriate habit patterns is alertness to new demands, understanding of new requirements. The intelligent individual modifies his patterns of behavior. He does not permit them to determine his behavior except at the points where no change is needed. At such points the patterns serve to relieve conscious effort and direction.

Summary. Because of the service which habitual patterns of behavior may render, it is important that consideration be given to the following rules for habit formation:

1. Get started right.
2. Permit no exceptions.
3. Give attention to practice.

To the foregoing a fourth rule needs to be added for the benefit of the teacher:

4. Pupils should learn the rules of habit building.

Habits, once formed, possess the characteristic of inflexibility. They become hard and fast. They may impede development. They may make further education difficult. Certain solutions of the difficulty have been presented. These may be summarized in the following additional rules:

5. Be conscious of the changed or changing situation.
6. Let the setting determine the behavior pattern.
7. Make habits steppingstones to higher levels of behavior.

Chapter 7

Perception and Imagination

Purpose of the chapter. There are two coordinate phases of education to which the student must give attention if he would secure a comprehensive and understandable view of the process. One phase is the acquisition of experiences, the gathering of the raw materials of an education. The other phase is the organization of experiences, the construction of the raw materials into the finished structure. In the chaotic world of childhood and in the confusing world in which adults frequently find themselves, the immediate need is usually not a further piling up of experiences, but rather a method of finding one's way through the conflicting experiences that surround.

Preceding chapters have emphasized the former phase of the educative process. The present chapter and those that follow give emphasis to the latter phase. The purpose of the present chapter is to indicate that the simplest experiences of the individual are in reality the combinations and arrangements of the stimulations the outside world provides, and that such experiences may combine into new ones the outside world does not provide. The purpose is to show how perceptions derive from sensations, how earlier perceptions influence later perceptions, and how imagined experiences relate to actual ones. The discussions deal with three topics: (1) the development of perception, (2) the activity of recognition, and (3) the nature of imagination.

1. The Development of Perception

Perception is a complex experience. The act of perceiving is not a simple experience. When we perceive even such a simple figure as a short straight line, our experience is complex. This we may demonstrate by experiment. Suppose we draw a line some six inches long on the blackboard of a classroom. Now let an observer in the rear of the classroom attempt to draw a line of equal length on a sheet of paper. Comparison of the lengths of the two lines reveals considerable discrepancy. The line on the blackboard appears much shorter to the observer at the rear of the room than it actually is. While the observer sees the line, he receives sensory impressions from the blackboard on which the line is drawn. Visual impressions come not alone from the line, but also from its total background. Thus he perceives the line, not alone as the visual impressions that come from it reveal it, but also as the visual impressions that come from its background serve to set it off by comparison and contrast. The conditions which surround the line are quite as important in determining the perception of its length as is the line itself.

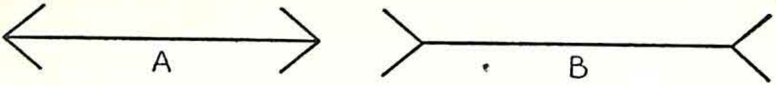


FIG. 6: *Müller-Lyer illusion; lines A and B are equal in length*

The influence of surrounding conditions upon what otherwise appear to be simple perceptions is demonstrated in those incorrect perceptions we call illusions. To illustrate, we draw two straight lines of equal length. Next, we inclose the two lines in arrowheads, the one set pointing inward and the other outward, as shown.

The two lines *A* and *B* now appear to be of different lengths. There has been no change in the lengths of the lines or in the visual impressions they give. The change in apparent lengths is the change we have introduced into the complex perception of each. At the outset, we perceive the lines against a similar background. Next, we perceive the lines as the inclosing arrowheads give them each a different background. Our perception of the lines in each instance is a complex experience. At the outset, the perceptual complexity is the same for each; later, the inclosing lines provide a different perceptual complexity.

Sensations are never simple. The sensory stimulations that enter the central nervous system always come in complex groups, never singly and alone. Three facts are pertinent. The world that produces the stimulations is complex. The functions of the sensory organs that receive the stimulations are different and specialized. Each sensory organ is specially constituted to receive its own peculiar type of impression.

We readily distinguish between and classify the various kinds of sensory stimulation according to the various organs of sensation that receive them—visual, auditory, and so on. We do not so readily note the degrees of intensity of any simple stimulation. Yet they also serve to give complexity to the simplest of sensations. A single solid color is not at all points exactly the same at any given moment, owing to variations in light and shade that for the most part are unnoticed. A green lawn may be uniformly green, but its coloring from points close at hand to points far away varies from lighter to darker. Much more variegated and complex are the stimulations, not only of light and shade, but also of coloring, that come from a single object such as a book on the desk, a chair in the room, or a rosebush in the yard.

The organs of sensation add to the complexity of sensory stimulations. The retina of the eye, for example, has only a very small area that is useful for distinct vision, the surrounding area being useful in the main for gross distinctions of light and darkness and for the apprehension of movement. The taste buds on the tongue are not uniformly sensitive. The tips of the fingers, the back of the hand, the sole of the foot, and various other areas on the surface of the body are all different receptors in the combined sensation of touch. Light impressions from a single point strike the two eyes, and sound vibrations from a single source enter the two ears, from different angles.

The sensing of an object, however simple, is further complicated by the simultaneous arrival in the central nervous system of impressions through the different senses. Thus we not only see an object, but also hear the sounds it may give off and may smell it and touch it. At the same time we may be receiving other dermal sensations, such as pressure, warmth, cold, or pain; tasting a substance that is in the mouth; feeling the interplay of muscles and joints; and experiencing the organic sensations of thirst, hunger, nausea, and the like. At one and the same time we may experience all the different sensations—visual, auditory, gustatory, olfactory, dermal, muscular, articular, and organic. Incoming impressions through the different senses are confusing in their abundance.

Perception begins through the selection and combination of sensations. Out of the great mass of sensations that intrudes upon a person's consciousness, he selects certain ones which in the interests of practical life appear to belong together. These he combines into a given unit of experience and thus sets them apart from the rest. For example, he sees an ice-cream cone on a warm day. He notices its pleasant odor. He feels its rough surface and its pleasantly contrasting coldness. He feels its creamy surface with his lips and tongue, and tastes its combination of flavors. Internally, feelings of desire change to those of satisfaction. What has actually happened is that for a brief space the person has separated, concentrated upon, and fused a huge mass of sensations into a single unity. Simultaneously, he has neglected other sensations, or has distinguished them as belonging in other unities. What the person has done is to unite certain visual sensations together with certain sensations of touch, smell, and taste, and to combine all these with certain resulting muscular and organic sensations into a single perception. The perception results from a fusing of sensations that belong together.

Sensations may have both space and time order. One product of the fusion of sensations in the perception of the ice-cream cone is the experience of space relations between the various sensations. In the total perception was the perception of the cone as right side up or upside down and of its position as being within reach of the right or left hand. And combined with the total bulk of sensations which were fused into the perception of the cone were the sensations of feet on the ground, of the position of the head with respect to the cone, and a host of other sensations. These all gave a certain spatial order into which sensations from the cone fitted. These other sensations usually are in the background of consciousness. Yet their presence is evident when anything disturbs their usual order. If, for example, while the person was reaching for the cone, he had tripped, the perception of his relationship with the ground would have come immediately to the fore and crowded the perception of the cone into the background. The recognition of the cone was not a single item of experience. It simply had a certain "place" in the total perceptions at the moment.

Sensations arrange in consciousness not alone as they relate to each other in space. They sometimes have a time order, which is a further means of arrangement. The perception of time is a matter for later topics. We shall take up at this point the perception of the forms of things.

Movement may aid the perception of form. The way we perceive the forms of things illustrates the combining of sensations. We may explain the perception of form by reference to several facts. Sensations arrive simultaneously in the nervous system from several parts of an object under inspection. Sensations arrive in variations because of binocular vision. Sensations arrive in a time order and assume a time arrangement. For our present purpose, let us examine the variations that result from binocular vision.

In viewing an object, a person does not see it in exactly the same way with each of his two eyes. With the right eye he sees farther down the right side of the object, and with the left eye farther down the left side. He may note differences between the visual impressions of the eyes by looking at an object with first one eye closed and then the other. The differences in the visual sensations of the two eyes give the object depth. The perception of depth results from the fusion of slightly different visual impressions that come in through the two eyes.

Movement adds to the sensations a person gets from an object. To get impressions from its several parts, he moves his head from side to side and runs his fingers over the object. To help in fusing the various sensations into a perception, he traces an outline of the object in the air or pretends the movement of tracing its outline. This type of activity provides the sensory material for the kinesthetic, or muscular, phase of the total perception. The attempt to draw illustrates the assistance that movement gives to perception. The act of drawing, or of attempting to draw, serves the double purpose of setting a person to the seeking of more sensations for a more complete perception and of building up the muscular perception of the object. Drawing requires a better perception than do the ordinary purposes of recognition.

Form is attended to according to purpose. Purpose determines the amount of movement that accompanies perception. The purpose to draw an object requires much extra movement to gain more sensations. Purpose determines the kind of perception that results. The child may have a perception of his written or printed name that is sufficient for the purpose of recognition. This perception is wholly inadequate for the writing of the letters or the distinguishing of the name from other names and words that have a somewhat similar appearance. Later, when the child comes to school and begins the tasks of learning to write and read, his purposes change and enlarge. In terms of his new purposes, he builds up wholly new perceptions of his name and of other letters and words.

Ordinarily, a person does not go about examining objects to build up perceptions of their forms simply for the sake of developing better perceptions. He seeks better perceptions for the values they have in meeting his purposes that are outside of, though intimately related to, the better perceptions that he seeks. To illustrate, he seeks better perceptions of objects for the purpose of drawing them; of letters, for the purpose of writing them; of words, for the purpose of recognizing them in reading; of persons, for the purpose of knowing who they are the next time he meets them; of plants, for the purpose of classifying them; of different land formations, for the purpose of discovering the effects of erosion; of chemical substances, for the purpose of analyzing them; and of configurations of space, for the purpose of determining their beauty, symmetry, or characteristics.

The recognition of time is a result and a means of arrangement. Consciousness of time is not the product of sensations from the outer world. It results from the inner experience. Its point of beginning is the unity of experiences in "the present," and its duration results from the compactness a series of experiences seems to possess.

Consciousness of time begins with consciousness of the present. Though mathematically the present is the single moment or point that separates "the past" from "the future," in consciousness the present is, within limits, not time at all, but all the sensations that enter consciousness simultaneously or that seem to belong together without the aid of memory. The resort to memory to recall certain sensations to go with those immediately present in order to build up a perception stimulates consciousness of the passage of time. Thus, in consciousness the present may involve the passage of considerable time and may actually be in large measure the immediate past also. For example, a person may spend an hour reading a swiftly moving story or watching a movie thriller, and feel at the end of the experience that only a few minutes have passed. Consciousness, then, of "only a few minutes" as belonging in the past puts the rest of the total actual time consumed in what he recognizes as the present. Thus, the present is not merely the present moment, or the present minute, but many minutes in the immediate past also. The compactness of all the experiences from the story or the thriller in a unified whole of meaningful relations accounts for the present as being experienced as of no duration, when actually it is both present and past and of considerable duration.

On the other hand, when the experience is of an opposite nature—that is, when one set of sensations seems wholly out of relationship with every other set—the sensations of the present move quickly in consciousness to the immediate memory of the past. At no given moment does the present seem long to endure. The moment that was some time ago the present has moved into and become the past and what is now the present is far removed from it. As a consequence, one feels that he has had to endure the experience for a longer time than actually transpired during its course.

Later, when one recalls the two contrasting experiences, he can truthfully say that the hour at the movie seemed to be no longer than a few minutes, and that the hour's lecture seemed to be two hours in length. His consciousness of time and the actual passage of time seem to be two different, and in large measure unrelated, facts in the world. Consciousness of time is a product of the way experiences combine. It is likewise a means of giving order and sequence to experiences.

Time periods are interpreted according to what is in them. A set of experiences such as the movie thriller or an exciting series of events, because of the interrelations of meaning that are present, serves to give character to a given period of time. This is the less familiar fact relative to the use and value of time periods in the learning of history, for example. The more familiar fact is that time periods, once they are comprehended, serve to give order and sequence to a series of events. The use of time periods—and their use is recognized only as they are comprehended—is to set one series of related events both apart from and in proper relation to other series of related events. How the periods become comprehensible the student of history either takes for granted or neglects to consider.

The fact that historical periods of equal duration seem to be of different durations indicates that the student should give some thought to the apprehension of the periods. Let us compare the two centuries, the sixteenth and the nineteenth, or a two- or three-hundred year period in the Dark Ages with a like period in modern times. In each comparison the latter period seems the longer. The reason is that we have a large body of content in mind to fill each of the latter periods, and only a relatively meager body of content to fill each of the former periods. We may say that other things being equal a period of time assumes a length in proportion to the amount of content that is at hand to fill it.

The amount of content in a period is not the most influential factor in determining its apparent duration. How the content relates is the factor of real significance. Let one compare the last two or three years of his life with an equal period in his youth. There is much more experience filling the later period, and giving it greater apparent length. On the other hand, the larger amount of relationship among the experiences of the later period gives it more compactness and correspondingly reduces its apparent length. If a person can recall his youth, he may remember how slow Christmas seemed to be in coming, and in comparison how rapidly it comes today. Though in his later years he has much more experience to fill his days, this experience commonly has a better internal relationship than was the case in his earlier years. Not alone what goes into a period of time serves to determine its apparent length, but in the main how the content hangs together in units of meaning.

Summary. A perception is a combination of sensations.

The nature of a perception results quite as much from the way sensations combine as from the sensations that go into the combination. In the course of experience, patterns of space and time develop as means of giving order and system to perceptions. The complexity of perception that results from the coloring its setting gives, and from the form its pattern shapes, suggests the importance of context in determining the meaning of a thing. It also suggests that a thing learned in one situation may not appear the same in another situation. The discussion of perception has developed the following points:

1. Perception is a complex experience.
2. Sensations are never simple.
3. Perception begins through the selection and combination of sensations.
4. Sensations may have both space and time order.
5. Movement may aid the perception of form.
6. Form is attended to according to purpose.
7. The recognition of time is a result and a means of arrangement.
8. Time periods are interpreted according to what is in them.

2. *The Activity of Recognition*

Perception depends on experience. There are two bases of perception. One is the *physiological* basis, the sensations which are the raw materials of perception and out of which the perception is formed. The other basis is internal, and may be called the *psychological* basis. This basis determines the form into which the sensations fall, the pattern into which they combine. The former basis is comparable to the materials for the building of a house, whether wood, or brick, or stone. The latter is analogous to the architect's plans. As in the building of a house, so in the building of a perception, the arrangement of the materials is as much a determiner of the final product as is the kind of materials. The plan in each case is usually the more important factor, because the materials that are used in the building are selected and shaped according to the requirements of the plan. Or, to change the figure, the cloth is cut according to the pattern.

The plan of the structure, whether of a house or of a perception, is the result of many influences, including that of the kinds of building materials available. In building a perception, the plan is the outgrowth of previous experience. In the combination of a group of sensations into a perception, the influence of experience is always a contributing factor. The tendency is ever-present to combine a group of sensations according to the way they have combined in the past. Continued repetition strengthens the tendency. Perhaps nowhere else is the force of habit so clearly in evidence as it is in the patterns that give shape to perceptions.

Yet we commonly assume that all anyone needs to do to sense a situation is to place himself in the midst of it where he can look at it, or listen to it. The teacher frequently makes the mistake of believing that his pupil, as does he, will note the characteristic features of a map, or a picture, or a specimen, or a process, simply by looking and seeing. Likewise, it is a common belief that young teachers in training can gain much by going without preparation into the complex activities of a classroom and observing the pupils and teacher at work. The truth of the matter is that what a person observes results as much from what is back of his eyes as from what is before them. It is the experience of teachers that to expect pupils to profit from a given lesson of whatever form—discussion, explanation, demonstration, observation—they must adequately prepare them for it in advance. It is everyone's experience that he sees what is in his mind as well as what is before his eyes.

All perception is according to pattern. The perceptual pattern into which a given group of sensations fit remains to give form to the sensations when they again occur. It even gives the customary form when the recurring sensations are incomplete.

To illustrate, let us recall that depth is part of the total pattern of the perception of objects that are viewed customarily by the two eyes at once. When the observer closes an eye and thus reduces the double set of visual sensations to a single set, the pattern of depth remains. He still perceives depth. He does not receive sufficient visual stimulation with one eye to give a perception of depth. Nevertheless, because of his past experience in perceiving the depth of objects, he fails to note the lack of depth.

Again, let us recall the experience of driving in the fog.

We recall how large an approaching car appears and how quickly it is upon us as it looms suddenly out of the mist. We are accustomed to perceiving dim objects as being at a distance, and objects at a distance as being the same size as they are when close at hand. Therefore, when the approaching car comes into view near at hand, we perceive it as a car of huge proportions a longer distance away. At once the car is actually at hand. It seems to have traveled the mistakenly perceived longer distance when it was actually traveling one that was very short.

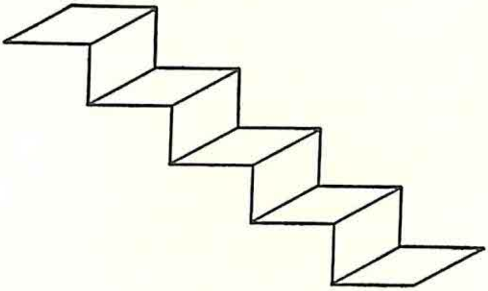


FIG. 7: *Stair figure*

Figure 7 presents a series of black lines on a white page. When we look at the figure, the black lines against their background are all we see. Yet we seem to see a staircase. The reason is that earlier perceptions of staircases are already a part of our mental content. Here again is an illustration of sensations combining into a perception according to the pattern that past experience has provided. The fact that the figure is not necessarily a representation of a staircase will be evident if we continue to look at it. The figure of a folded cardboard seems to appear and disappear.

Past experience determines the selection, as well as the fusion, of sensations. When a child has his first tangerine, he is apt to refer to it as a "little orange." He thinks of the tangerine as an orange because the sensations he gets from it are much the same as those he is accustomed to get from the orange. If, however, he gains sufficient experience with the new kind of fruit, he will begin to notice slight differences from the older and more familiar kind —differences in size, in color, in texture of the skin, and in taste.

He will then be able, when he sees a tangerine, not merely to get the whole mass of sensations that derives from it, but to select for special attention those special sensations that distinguish the tangerine from the orange. His experience will then have given him the ability to discriminate between different complexes of sensations which at first appear to be the same, or which at first are combined according to the same pattern.

A further illustration of the influence of experience on the selection of sensations for fusing into a perception is the progression of steps in training to overcome an illusion. Let us suppose the illusion is the one shown in the accompanying figure.

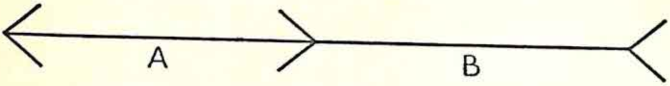


FIG. 8: *Müller-Lyer illusion*

At the outset of a person's efforts to overcome the illusion that line A is shorter than line B, he sees the figure as a whole. Next, he may try to neglect the parts of the figure that create the illusion—namely, the inclosing arrowheads. The effort reduces the illusion, but does not overcome it. The conflicting impressions of the arrowheads continue for a while, however much he tries to avoid them. Finally, in the last stage of the training, he no longer tries to neglect any of the impressions. At this point they all fall into their appropriate patterns without interfering with each other. At this point the illusion is overcome. Experience after a time makes possible the selection of only the sensations that are needed for fusing into perceptions of the two lines.

Discrimination develops in terms of purpose. Changing an illusion to a correct perception is another illustration of the development of ability to discriminate in terms of purpose. The person sets out with the purpose of overcoming an illusion of unequal lengths of two lines that actually are of equal length. The result is his ability to discriminate from the whole complex of sensations the ones he needs to provide the correct perception. The point for consideration is that it is not mere experience that counts in the development of sensory discrimination, but experience that is directed by a purpose that gives meaning to the discrimination.

Keenness of discrimination comes neither as an end in itself nor as a prelude to the training which requires it. It is instead an incident of such training. The musician has no special preparatory course in the discrimination of tones as prerequisite to his training in music. He learns to discriminate tones as the progressive stages of his musical training make such learning necessary. Women as a rule are good discriminators of colors, far better than men. They do not set out deliberately to become good judges of colors and of color harmonies. They became good judges as the requirements of their developing purposes to keep abreast of the changing styles in dress demand. The artist learns to discriminate forms and shades and coloring as he learns his art. This fact is made impressive to the ordinary person when he attempts to draw the simplest object. He discovers when he begins the drawing that he must observe the object much more closely than his usual experiences with the object had ever required.

The relation between discrimination and purpose may be stated in another way. Looking for and trying to sense the distinguishing features of an object trains a person in knowing just what features to look for in order to recognize the object. The botanist is the first to note the wild flower; and the geologist, the interesting rock formation. Each knows what signs to look for to recognize the object of his special interest. Each knows the meaning of the signs as soon as he sees them. As an earlier topic has indicated, all perception is according to pattern, and what a person is able to see is determined quite as much by the mental content back of his eyes as by the physical world before them.

Our discussions to this point have emphasized the dependence of perception upon earlier perceptions. They may be summarized in the following statements:

1. Perception depends on experience.
2. All perception is according to pattern.
3. Past experience determines the selection, as well as the fusion, of sensations.
4. Discrimination develops in terms of purpose.

All the while our discussions have touched upon the activity of recognition, the activity of knowing again that which earlier had become a part of experience.

Recognition may be an initial, as well as a repeated, perception. Cognition is knowing, and recognition is knowing again something already seen, or heard, or tasted, or felt. The knowing again may relate to an entire experience or to a phase of an experience in a new setting. Having made the acquaintance of a person, we recognize him at a later meeting. Having become well acquainted with the person through frequent meetings, we recognize his brother, when we first see him, by noticing his possession of similar features. The beginner in reading recognizes an old word because previous contacts have made it familiar. He can recognize a new word when he gives attention to the way it resembles words he already knows. The pupil breaks away from total dependence upon his teacher for an introduction to new experiences when he learns to rely upon his own developing abilities to provide his own introduction. The ability to note and recognize resemblances between the new and the old is an essential. This ability makes the new experience understandable in terms of old and familiar ones. This ability makes the new experience one that is not unfamiliar even though it has never been met and known previously.

Recognition may improve through training. A person improves his recognition of anything that is new in three discernible stages or steps: (1) he recognizes by sensing and attending to an insignificant, but striking, detail; (2) he recognizes by sensing and attending to all the details; (3) he recognizes by sensing and attending to the distinguishing total form or characteristic total appearance.

For illustration of the three steps, we may return to the example of making the acquaintance of a person. When we are introduced we note a striking general appearance, or a significant mannerism. This immediately strikes the eye at succeeding meetings and we feel able to distinguish the person from the rest of humanity. But, before we are fully acquainted, we meet his twin brother, let us suppose, or we see the two of them together. Our confusion immediately impresses the fact that our former apparently sufficient observation of the appearance of the individual is decidedly insufficient. Now we are forced to observe more carefully the details of the person's appearance as well as the details of the appearance of his twin brother. Finally, when we have met the two sufficiently often, we learn to recognize and distinguish each at a glance, because succeeding observations of details have built for each a new characteristic total appearance, or new dominating mannerism, to serve as a clue to recognition.

Trained recognition does not require sensory stimulation to be complete. As recognition develops through training into a more and more effective act, it is set off by fewer and smaller sensory cues. Our friend's manner of walking enabling recognition, the general contour of the ground indicating a familiar landscape, and smoke rising from a distant object identifying a building as a house, are examples of single consciousness cues. The sight of the game by the hunter is a sufficient cue to set going the total act of bringing the gun to position, aiming, allowing for distance and speed, and pulling the trigger. Similarly, minor details of word-form and phrase-form are sufficient cues to set going, for the reader, the recognition of the words and phrases on this page. In either case, of hunter or of reader, there is consciousness concerning details.

To recognize an unfamiliar object we must make a close examination of details. For example, if a word is unfamiliar, we may need to look it over letter by letter or syllable by syllable. As the object becomes familiar, we need to sense fewer and fewer sensory cues. Indeed, most of the sensory cues that come from the objects we recognize are blurred and indistinct. The succeeding topic explains why the sensory cues in reading are never more than partially clear.

We may recognize a familiar landscape at a glance. The one glance produces the mental picture in all the details earlier inspections have built into it—the general contour of the land, and the position of every tree and shrub, of paths and roadways, and of rocks and grassy knolls. A closer examination may reveal details which we had not seen at the first glance. Regarding many of the more familiar details, we cannot be sure whether we saw them actually at the first glance, or saw them as they are pictured in our mind's eye. Indeed, a second glance will often reveal that a number of details which we were quite sure we saw at the first glance are greatly altered or have entirely disappeared.

Again, the mind does not require many sensory cues to enable us to recognize a friend. A glimpse as he passes, the sound of his footsteps, a mannerism—any of these is sufficient sensory cue for recognition. In similar manner, we recognize a rosebush without the necessity of being near enough to see clearly any of its leaves, and we recognize a brick house when we are so far away that we could not see a single brick if it were held up by itself for us to view.

The reading of the blind is a frequently quoted illustration of the general character of recognition. In the Braille system of printing the letters of the alphabet are represented by tangible points and dots raised above the page. A practiced reader of these raised-letter pages goes ahead with the fingers of his right hand to examine the total form, or general outline, of the words and phrases. The fingers of the left hand follow, moving successively over the letters in order to sense the details. The practiced reader touches only a part of the letter, passing over others without touching the points. He conjectures those he does not sense.

The mind supplies what the senses fail to provide. The mind not only does not need complete sensory stimulations; incomplete sensory stimulations are the only kind it gets. For illustration, we may note the kinds of visual stimulations the eyes provide during the process of reading.

In the back part of the retina there is a small depression called the *fovea* in which is closely packed a large number of *cones*. Beyond this area there are both *rods* and *cones*, the percentage in the number of rods increasing as the distance toward the outer areas of the retina increases. These rods and cones are highly developed nerve cells which are specialized for the reception of light stimulations. They have different functions: both are sensitive to light impressions; the cones alone are useful for distinct vision.

The area of the retina that is made up exclusively of cones and is useful for distinct vision is very small. It is about one-fifth of a millimeter in diameter, and includes about three-fourths of a degree of the retinal image, which corresponds (for ordinary type at the usual distance from the eye) to no more than three or four letters. The eye, of course, sees more than this amount; three or four letters are all the eye sees *distinctly*. Beyond the limit of distinct vision the retinal image becomes less and less distinct; only the outstanding characteristics of letters and words can be seen, and they more and more faintly as the distance from the point of fixation increases.

However blurred and imperfect may be the sensory photograph of an object, it turns out to be satisfactorily clear and perfect as we observe it mentally. Recognition is a filling in by the mind of the necessary details to complete the very imperfect sensory photographs produced upon the retina. It is a projection outward of a mental picture that is already in the mind's eye. Just as it is possible for us to reconstruct in our mind's eye a mental picture of the appearance of any of our large stock of familiar words, we can actually reconstruct in our mind's eye the appearance of familiar words as a result of the very inadequate retinal images that are reported to the visual centers of the brain during the process of reading. Words with letters interchanged or altered or omitted are reconstructed in complete detail.

Summary. Our discussions of the activity of recognition have developed the thesis that the efficiency of observation depends upon the content of the observer's mind quite as much as upon the object of his observation. Having eyes to see and ears to hear, the observer must have a pattern of perception for seeing and hearing. The discussions center in the following main points:

1. Perception depends on experience.
2. All perception is according to pattern.
3. Past experience determines the selection, as well as the fusion, of sensations.
4. Discrimination develops in terms of purpose.
5. Recognition may be an initial, as well as a repeated, perception.
6. Recognition may improve through training.
7. Trained recognition does not require sensory stimulation to be complete.
8. The mind supplies what the senses fail to provide.

3. The Nature of Imagination

Imagination has its basis in perception. The use of imagery in filling in the details of incomplete sensory stimulations that lead to the activity of recognition is implied in the section immediately preceding. The images so used are not perfect, yet they seem to be perfect. They actually are perfect enough for all the practical purposes of recognition. Our earlier discussion has also indicated that the expert imaging, or filling in, of sensory details is the product of training in the building of perceptions. For example, the pupil does not suddenly become an expert in the recognition of words in reading. His expertness results from a preliminary period of training in the securing of complete sensations from printed words and in the building of these complete sensations into complete perceptions.

When once we have perceived an object, we can recall it in *imagination.* Having formed a perception of a new inkstand on the desk, let us say, we can shut our eyes and picture it in imagination. The image is incomplete—so incomplete that we do not actually "see" it with closed eyes. Yet the image is complete enough to provide the feeling of unmistaken familiarity and of confidence that the image is the counterpart of the actual inkstand. In this instance, motor imagery supplements the visual imagery. Though we may not "see" the whole outline of the object at once, we can go through the motions, or pretend to go through the motions, of tracing the outline. We may add that there are as many kinds of images as there are kinds of perceptions—visual, auditory, kinaesthetic, and so on.

Imagination differs from perception in an important respect. In imagination there is present the consciousness of an object of sensory experience *with the additional consciousness that the object is not immediately present to the senses.* Frequently we confuse imagination with false perception. We assume that the person with an active imagination gives himself over to a world of unreality and is the victim of illusions and hallucinations—that is, of normal false perceptions and abnormal false perceptions. This assumption is misleading because it is untrue. False perception is clearly distinguishable from imagination. False perception exists when there is a consciousness that an object, or the quality of an object, is present to the senses when actually it is not present.

Imagination extends experience. The revival in consciousness of a former perception or a number of former perceptions, without essential change, is *reproductive* imagination. The revival of former perceptions or parts of former perceptions, combined in new ways, is *productive,* or *creative,* imagination. Reproductive imagination within itself adds little directly to experience. Its contribution is the theme of the next chapter. Productive, or creative, imagination is the chief means of broadening experience. It is the means of reconstructing experiences into new and indirect experiences.

As we read a story, for example, we see in our mind's eye a series of mental pictures of the events portrayed and of the settings of these events. These mental pictures are not exact reproductions of our past perceptions. They are pictures of new scenes, scenes never before experienced. Yet they all relate to our past perceptions. At many points we can readily note such resemblances, for the mental pictures are re-creations of past perceptions in new combinations. The reader of *Ivanhoe* becomes a participator in imagination in all the thrilling adventures of Ivanhoe. He enters the lists with Ivanhoe; indeed, he is at the time Ivanhoe himself entering the lists. Out of his past experiences he builds such experiences as he gets from the story, all the scenery and all the activity; and out of the multitude of people he has met in life, in history, and in fiction, and also out of his own personality, he creates for himself the Ivanhoe of his story. The pupil learning his lessons in history creates out of his own limited experiences new and indirect, though nonetheless real, experiences in which he is an active participant. In his mind he lives the lives of children in Greece. He follows Caesar's legions through Gaul. He views with the children of his stories the conditions of life in the colonies, or he travels with them across the plains, or he takes part as an imagined but active participant in the building of the pioneer home and in the wresting of a living from the forest and the soil. Creative imagination is the means of extending experience away from the present, away from the immediate environment.

Imagination brings order into a complex world. Through creative imagination we bring together into an indirect experience two or more perceptions, or experiences. We may also create an idea of relationship which gives them meanings. The primitive man, for example, combined in his imagination the products of his experiences to create human personalities. These he attributed both to animals and to inanimate objects. He created superhuman personalities, also. To these he acknowledged control of both man and nature. By such means he found a purpose for existence and an explanation for the natural phenomena that came within the bounds of his observation. As he learned new facts about man and nature, he continued to create similar meanings and coherencies for them, until finally these products of his creative imagination broke down under the weight of their incoherencies.

The modern man of science similarly engages himself in combining the products of experience in imagination. He has certain advantages, of course. He has extended his powers of observation far beyond unaided human limits. He possesses not only his own extended observations, but also those of his fellow scientists of the present and earlier generations. He has checked and rechecked his created theories against the whole body of observed facts that is their common possession.

The common man of the modern world likewise resorts to creative imagination to bring order into the complexity of his experiences. However physically active he may be in gaining direct experiences in the workaday world, he on occasion retires from these direct contacts in order to combine his observations and experiences in ways that have a more pleasing or a more satisfactory appeal. The teacher plans a more effective curriculum for his school. The businessman plans the methods of opening up a new trade territory. The farmer plans a different rotation of his crops. Everyone plans what at the time seems to be a more productive and satisfactory manner of life than he has hitherto actually experienced. The common man then returns to his actual world of everyday work and experience and uses his new ideas, the new products of his creative imagination, to give his actual efforts a better and more intelligent direction. Henceforth his actual world has a new meaning, because henceforth it is perceived in terms of his new mental content.

Imagination creates a world of fancy. The common man finds the products of his creative imagination of service to him only as they square with behavior. There are many failures in life who in their minds are great inventors, great financiers, great leaders of men, great captains of industry, great scientists, great explorers, or great social reformers. The fault is not that they have too much imagination. Darius Green had much less than the Wright Brothers. The fault is that they neither check their imaginings against the hard facts of the actual world nor put their imaginings into practice.

Children are known to create for themselves a world of fancy. This is a privilege of childhood, and as such it should not be discouraged. Much of the educative play of children is imaginative play. They people the world with fairies, and gnomes, and elves. They ascribe human characteristics to animals. They believe in Santa Claus. All this is not unusual, and it should be expected in the normal child. His imaginings check with the facts of his world of actual experience, and as this world is enlarged he may be expected to correct his imaginings. Moreover, he does not confuse his imaginary world with the real one as it becomes known to him. The boy bestrides a stick, but he does not confuse it with a real horse. Neither does the girl mistake her mud pies for the ones her mother bakes. If the child is not overencouraged in his imaginings by his too enthusiastic elders, he may derive positive values from them. In the first place, he gets practice in the art of combining experiences into imagined ones. Secondly, he gets practice in checking his world of fancy against the facts of the actual world as he meets them. Finally, he is impressed by the ideal in human relations long before he can understand it in the abstract. Belief in Santa Claus gives perfect representation to the traits of kindness, unselfishness, and charity, whereas in the actual world they are seldom, if ever, found in a perfect state.

The world of fancy must be limited. From the standpoint of the training of children and youth three principles must be kept in mind: (1) It should be one of the purposes of education to assist and guide pupils in the creation of ideas out of their experiences, and in the gaining of many indirect experiences. (2) The older generation, in school and out, should train the younger to check the products of their creative imagination against behavior and actual experience. (3) The products of uncontrolled creative imagination should never be permitted to be mistaken or substituted for the products of controlled creative imagination. As regards the third principle, we may permit the pupil in his history or geography work to create interesting and intriguing stories of peoples of other times and lands as his fancy may lead him, or we may require him to re-create the history and geography he learns under the constant stimulus that is provided by adherence to the content of authoritative books. Though the pupil must re-create in his own mind the multiplications in arithmetic in order to understand them, he must not have a free hand in the creation of multiplications that are inexact or at variance with the decimal system of notation. We may encourage the pupil in fancifulness in respect to some things, and we must hold him to strict adherence to actualities in respect to others. As the preceding paragraph has indicated, children have little difficulty in distinguishing the fancied from the real.

Consistency is the check of imagination. A person is at liberty to combine his perceptions as he wills, and to create in his imagination any kind of world that he chooses. It is to his advantage, however, to govern his combinations and creations by the standards of reality, to make combinations and creations that are true. But what is true? How may we know the truth? In every generation these have been important questions.

The answer that human experience gives to the questions is that we may judge what is true by the standard of consistency. Thus, if the product of the person's creative imagination—his idea, or theory, or belief—is consistent with all the facts which produce it, and if it remains consistent with new facts as they become known and serves to keep all these facts in consistent relations with each other, then the product in the form of an idea or a theory or a belief is true. If new facts come to light with which the idea or theory or belief is not consistent, then the person must create a new mental product that corrects or expands or supersedes the old—a new mental product that is consistent and, therefore, true. It is in this way that science changes and grows. The history of science is the story of the search for truth, the story of the continual substitution of more consistent beliefs for less consistent ones.

Summary. The significance of imagination in the education of the individual lies not so much in the ability merely to reproduce perceptions as it does in the ability to give perceptions a new organization. Through the power of creative imagination a person can extend his experience beyond the confines of space and time, and can build for himself a world of ideas to serve both as a retreat from the physical world and as a means of giving it order.

The discussion has developed the following points:

1. Imagination has its basis in perception.
2. Imagination extends experience.
3. Imagination brings order into a complex world.
4. Imagination creates a world of fancy.
5. The world of fancy must be limited.
6. Consistency is the check of imagination.

Chapter 8

Memory

Purpose of the chapter. Everyday experiences are confusing in their abundance, in their complexity, in their unordered sequence, and in their speed of approach and withdrawal. They shove the passive individual around. They upset him, crowd upon him, and weight him down. On the other hand, they assist the active individual according to the way he reacts to them. They supply the current which when harnessed gives power to his activities.

The active individual uses his everyday experiences to foster his development and to enlarge his view. He selects certain ones for special attention. He fits these into his perceptual patterns. He combines them into imaginative new experiences. He reserves them for later use. He also enriches the everyday experiences of his selection. From his reservoir of memories he supplies meaning and content they otherwise would not carry.

The present chapter discusses memory, its use and development. The chapter deals with two major topics: (1) how memories enrich the present experience, and (2) how memories may be effectively retained for later use.

Memory enriches present experience. The term "memory" as here used denotes the conscious recall of past events and the recognition of the fact that the recalled events belong in the past. Thus used, the term suggests conscious effort to recall. The recollection of past events without effort, which strictly speaking also is memory, is distinguished here as "present meaning." There is a difference between meaning that has to be sought out and meaning that is at hand ready for use. There is a difference between meeting a mere acquaintance and meeting a friend.

To illustrate, let us suppose that at the football game we notice the referee as a person we once had met or once had seen. We should know him, we feel; yet we do not. Who is he? We search our mind for the stray facts we are sure must be there in order to reveal who the referee may be. We run down one clue after another, one association after another. Then, let us say, we recall a chain of experiences that provides the needed answer to our intriguing question. We recall that the referee was the coach some years ago of a rival football team. Thus at last, after much conscious effort, we locate among our memories the means of enriching the present experience.

Similarly, every student has searched his memory for information to answer a question in an examination. The matter referred to in the question was not entirely unfamiliar, yet its explanation was not at hand. After much searching, with much effort, the student has often succeeded in recalling the desired meaning and explanation. Memory is an ever-present helper, but it exacts a high payment in effort for the values it gives.

Memory is less helpful than present meaning. The experiences of meeting a friend who is well known and of handling the well-learned answer to a question in an examination are much more satisfactory experiences than are those which must engage the memory. When a person meets a friend, the sensory experience is much the same as was ours when we gave our attention to the referee. But the experience of a person meeting a friend is full of meaning. The person does not search for memories of previous experiences to give him an explanation of the character and personality of his friend. He does no recalling, and makes no effort to recall. His mind is full of all his friend means to him. What his friend means is as immediately present as the friend himself. Similarly, when the student has a question that requires a familiar answer and a well-understood explanation of the familiar answer, he does not have to search among his memories of facts previously learned or of ideas previously developed. This is because the answer and its explanation are not in the past of his consciousness, but in the immediate present. There is no effort consumed in recalling. The meaning is a present meaning, not one that comes from memory.

Present meaning is thus a more helpful means of enriching present experience than is memory. Present meaning comes from our past experiences, as we know. Yet, when we have it, we no longer give it a conscious relationship to its past origins. It is only when present meaning is lacking that we must search our memories for the required means of enrichment.

Memory is a first step in developing present meaning. When a person looks into his mind, he finds present meanings in abundance. For the usual experiences of the everyday world, the meanings are satisfactory means of enrichment. Yet they frequently fail to clarify an experience that is out of the ordinary. Then the person becomes critical of his findings. He becomes impressed with the fact that many of his present meanings are inadequate and thin, that some are inappropriate, and that not a few are positively misleading, if not entirely incorrect. Suppose now that he recalls the facts in his possession which seem to bear upon his unusual experience. He may have cause to wonder why his past experiences give his present meanings so little basic support.

He does not have far to seek for an answer. Let us assume that he has had a long past experience in his job as student, or teacher, or clerk, or mechanic, or something else. The mere abundance of his experiences avails him very little, if he has not related them into logical units, or if he has allowed them to slip into forgetfulness. If a person has treated his experiences in this fashion, his job may mean but little, and that confusing, or it may mean something that is incorrect. This is because its present meaning may come from the day-by-day experiences that impress him or from experiences long since forgotten. Memory, in the sense of conscious recall and recognition, has played little part in the development of the present meaning of his job.

As our earlier discussion indicated, memory is a poor substitute for present meaning as a means of enriching present experience. Yet memory is a necessary and important first step in the development of an enriched present meaning. Memory provides a broad basic foundation upon which we may build an adequate present meaning. Building the superstructure makes the foundation useful and valuable. We may merely bring past experiences to light in conscious recall, or we may recall them in order to use them as materials to make and to enrich our ideas.

When we lack in present meaning, we try to recall past experiences as an aid. Such resort to memory indicates that our past experiences are in an unorganized state. If we stop our effort with mere recall, we allow our past experiences to remain in an unorganized condition. But if, when we recall them, we then resolve them into an organized unity, we gain a result in meaning that hitherto we did not possess. To illustrate, let us say that we recall several experiences which have a common element: experience 1 having the elements *a, b,* and *c;* experience 2 having the elements *a, d,* and *e;* and so on. Mere recall for the sake of a present experience may be taking so much of our attention that we are entirely unconscious of the common element *a.* But suppose that we proceed to examine the recalled experiences each in relation to the others. Soon we notice the common element *a.* We become impressed with the element *a,* because it is common to all the experiences. As we become impressed with the common element, we give it an importance that the other elements do not seem to have. We make the common element into a bond of relation between the recalled experiences and the substance of a new idea of relationship that we may never before have possessed. As the new idea takes shape from the significant common element *a,* the common element takes on an impressiveness that it did not hitherto possess; furthermore, it pushes, as it were, the other and uncommon elements into the background of our consciousness. We allow the uncommon elements to slip into forgetfulness while we retain the common element with the new and enriched meaning it has provided. In some such manner we transpose our past experiences, which at the outset were unorganized memories, into meaning that is present and ready for use and that does not require conscious recall. We make memory the

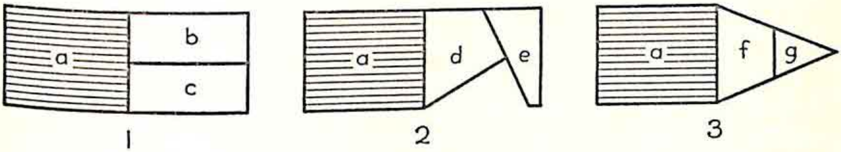


FIG. 9: *The common element of varied experiences*

initial step in the sorting out and sifting of past experiences to the end that we may retain only the parts that seem essential and vital.

Memory work does not guarantee the development of present meaning. Memory work is frequently the antithesis of useful learning. The schools of the past abused the memory work of pupils, and many schools continue the earlier abuses. The abuses have been so serious as to cause reaction against all memory work, including the kind that is needed for proper learning.

Earlier practice failed to maintain an appropriate balance between memory work and the organization of experiences. Present practice in many quarters exhibits similar failure. Many teachers continue to encourage their pupils to memorize and then evaluate their pupils' efforts in terms of the mere ability to recall. They thus make recall an end, and not, as it should be, the initial step toward a more rational end. Critics of such practice frequently err both in the placement of their criticism and in the remedies they prescribe. Noting the unsatisfactory results of the memory work of the school, they neglect to note the cause. They fix the blame upon what the school does, not upon what the school leaves undone. Thus, when they prescribe a remedy, instead of seeking to enlarge school practice so as to use memory work as the beginning stage of a balanced program of recalling experiences and organizing experiences, they in many instances seek an almost complete abandonment of memory work. In consequence, we may observe in school practice what amounts to a violent oscillation between an abuse of memory work and a misunderstanding of its importance, between memory work and little else in one classroom and no memory work in another.

Memory work can be avoided through training in the use of things. Memory work does not give immediate results. Memory work frequently is far from being educative. It is often a series of stultifying and confusing activities. Considered by itself, that is what it seems. Used by itself, that is what it actually is. It is no wonder that teachers become disgusted with memory work and seek a substitute for it. It is no wonder that they consider the questions: Why not abandon memory work and substitute the everyday experiences of pupils? Why not pass to present meanings somewhat more directly and certainly than by way of the tortuous road of memory work?

To these questions the student has an answer. He may recall the ideas and opinions he has formed by somewhat accidental means about the content of any one of the subjects he is now studying. He may recall his efforts in his study of the subject to gain information and remember it, and his use of the information from time to time to develop and criticize opinions upon assigned special topics. In short, he may recall the difference between the ideas he has gained as a result of study—memory work and the recall and comparison of his memories—and his earlier naïve opinions.

To the questions about the value of memory work, another answer is that memory work can be avoided. Training in the use of things gives meaning. Training in the use of things is direct practice in the performance of an activity, whether guided and supervised or not. It is the method of trial, or profiting by mistakes, and of continued trial. It fixes the attention upon the immediate present situation. It does not permit attention to wander back into what is past. Generally such a lapse retards the present learning, for memory of past attempts is usually a haunting recall of failure. Each present trial, each present attack upon the situation, goes at once into present meaning. Useless parts of each trial are dropped, and those parts that are useful or appear to be useful are carried along into the next trial. The final result is a habit of action, not a series of memories.

Learning to play a game is an illustration of training in use as distinguished from training in memory. To learn to drive at golf, for example, one starts by trying to hit the ball. He tries again, modifying each succeeding attempt according to his error or his success in the preceding attempt. Though he may have many memories of his past attempts to learn, he does not dwell upon them in his present efforts to learn. The ball is before him. He must hit it. The present situation, not any that is past, dominates his efforts. Learning to teach through practice teaching is another illustration. Here again the situation to be met is in the present moment, and reference to the past is both distracting and confusing. Through practice teaching the student may learn to use with skill the devices and methods of the school. Learning a trade through apprenticeship training is yet another illustration. Here again learning is of a highly practical and immediately useful kind.

Memory gives flexibility to present meaning. The type of training that avoids memory and escapes the necessity of memory is characterized by a lack of intelligence regarding the nature of the training. The golfer has little information about his various movements in making a successful drive, and he knows less about the steps he had to take in acquiring his skill. He can demonstrate, but he cannot explain. He has reached his present state of proficiency without the need of resorting to memory. In consequence, he now has little memory of past efforts to use in making clear his present accomplishment.

What a person thus accomplishes is characterized by its inflexibility. This fact does not usually disturb us. Suppose the expert cannot explain his skill—what is the difference? It is his proficiency in performance that concerns us. The answer may be noted in a view of two circumstances. In the first place, there is usually some defect in the performer's proficiency, and he can do little about it. He has no basis in memory to serve as a means of explaining his successes. Likewise, he has no basic memories to draw upon to explain his faults. He does not know why he is good in certain details of his total performance. He does not know why he is poor in others. In fact, he is usually uncertain regarding the location of his deficiencies. The result is that he tries to solve his problem by indulging in more practice. The added practice does not lead to improvement. Instead, it fixes more firmly and inflexibly than ever his defective habit of performance.

The other circumstance is that, however good in performance a person may be, he still must frequently face the problem of adjusting his training to new conditions. Conditions do not remain always the same. New conditions require new adjustments. The individual with an inflexible training, however adapted it is to the situation in which it was acquired, often has greater difficulty in making adjustments to new conditions than does the individual who has had less training. The teacher who has learned methods, devices, and skills in instruction through training in use only, or through practice alone, finds himself at a loss when he hires out to teach different pupils in a different school. He finds his once highly proficient methods, devices, and skills ill adapted to his new task. What is more to the point, he has few memories about how he developed them to aid him in making new adjustments.

Often the individual who has acquired inflexible training is helped in working out an improvement or an adjustment in his practice if he can recall the circumstance or situation that was the cause of a given defect or an inflexible item. The teacher, for example, may recall that he had developed his methods of vocabulary instruction to serve pupils who had certain vocabulary needs. Now, remembering the two together—namely, his methods and the needs they once served—he may start his thinking along the road toward a principle of vocabulary training for all pupils. In turn, this principle may guide his present practice toward newer and better adjustment. He may or may not be able to develop a principle of guidance. The point for us here is that as regards such a teacher, the principle has no soil in which to grow other than his memory of past experience.

It is not difficult to contrast the difference between the product of training in use and the product of training in recall and organization of experiences. The student who works his mathematics by rule-of-thumb methods differs from the one who understands the principles. The skillful player differs from the successful coach. The mechanic differs from the engineer. The artisan teacher who is much practiced in methods differs from the artist teacher who is the possessor of ideas. The former type of worker may be the more skilled, and may have the more practical knowledge. The latter type of worker is the more intelligent, and is the possessor of the more practical wisdom. The training of the former has shunned memory to develop habit, and is therefore more or less inflexible. The training of the latter has used memory as a basis for ideas, and is therefore more or less adjustable.

Memory enriches later experiences. Much that we learn today turns out to be very important in helping us to learn tomorrow. A person may carry into his later experiences memories from earlier ones which he can use to good advantage. Later experiences, in turn, enrich the memory. Poems we once learned, a memory gem here and another there, often shine forth with increased vividness in the light which newer and later experiences give.

Our discussions to this point have dealt with the value of memory and its use as a direct means of enriching present experience and as an indirect means of developing present meanings. We turn now to a brief consideration of the means of aiding memory.

Memory is aided through vivid impression. An experience is likely to be retained in the memory in proportion to the wholeheartedness of attention one gives to it or to the amount of attention it attracts. Often it is said that first impressions are retained longest. One remembers his first day at school, his first camping trip, the first fish he ever caught, or his first lesson in a given subject. This is because first impressions are new and different. In contrast with ordinary, everyday ones, they are clear-cut and vivid. A vivid impression is full of life; it stands out from all others that surround it.

Following the first impression, a person may have hundreds that are much the same. These later ones are less likely to be retained, simply because they are a monotonous repetition of the first. Yet we can cause any later impression to stand out vividly. When we see one of these later impressions in a new light, as an indication of a new idea or a new level of meaning, it becomes lively and vivid. For example, the primary pupil often has difficulty remembering such additions as nine plus seven, whereas he has no trouble with his first ones, such as two plus two, and so on. Additions like nine plus seven seem difficult; they do not impress except with their monotony. But suppose the pupil discovers that he may make these difficult additions in a way that is different from serial counting. Suppose he learns that each results in a teen, and then starts to work out each troublesome one in its relation to ten. Now, the otherwise difficult additions become impressive. Now, they stand out with a new meaning. As another example, two different students attack their lessons in geometry in different ways. One student tries to memorize the demonstration; another views the demonstration as a sample of conclusive proof. The first student fails to memorize, though he tries. The second student succeeds in memorizing, though he does not try. The explanation is found in the relative vividness of impression the demonstration makes on the two students. To the first student the demonstration lacks vividness; to the second, it is full of life and meaning.

The student can recall lessons that are full of meaning. To be able to recall lessons that lack meaning, he must somehow put meaning into them. We may say to the student who wishes to remember a lesson or a series of lessons: Make the lesson meaningful to you. Study the lesson until you understand it. From there on, vividness will make remembering easy.

Memory is aided through association. The making and the noticing of associations help to make impressions vivid. The contact of a given impression with others adds to the impression. The contact is an item of enrichment and gives extra significance. It is a tie that unites. It pulls the impression to the surface whenever others which unite with it are brought forth.

Association may be classified into three kinds. The most important is *logical* association, which gives vividness through added meaning. Next in importance is association by *contiguity*. A third kind is *artificial* association. Where no logical or contiguous association exists, a person may manufacture an association to suit the occasion.

An earlier discussion dealt with the relating of experiences as a means of developing present meaning. This association of experiences is not a passive reception of an impression of relationship. It is instead an active organization of experiences by an industrious, wide-awake individual. This logical association distinguishes common elements and fixes attention on them. As a result, common elements gain a new significance and a vividness that the related impressions did not originally possess.

Experiences that happened at the same time or in the same place are related by contiguity. Each touches the other. Each serves as a clue or cue to the other. We have no trouble filling the blank in the phrase, "ham and______"; in responding to the date, 1492; or in responding to the subject, multiplication table.

When a logical or a contiguous association does not exist, or when we can discover none, we may manufacture an artificial association. For example, students find it helpful in learning the *ie* and *ei* order of letters in words like *believe, receive,* etc., to associate with these words the word *lice*. Thus, they help themselves to remember that *i* follows *l,* and *e* follows *c*. Or, in learning the colors of the rainbow and their order, they use the meaningless word, *vibgyor,* which is made up of the initial letters of the names of the colors. Such aids are known as mnemonic aids. On occasion they are helpful.

Memory is aided through recall. Through the effort of recalling, a person often gives an experience a more intense attention than he did at the time he had it. The effort to recall is often an effort to try out several possible associations and finally to choose a satisfactory one. It sometimes happens that the act of recall adds to the vividness of the experience being recalled. Recall is a process of thinking over experiences. It brings them into new relationships.

The act of recalling does more than emphasize associations already made and lead to the discovery and formation of new ones. It anticipates possible later requirements to recall. In that way it stimulates a person to notice and to form associations he would otherwise overlook. To illustrate, if the student knows in advance that he must recite the lesson, his anticipation of the requirement that he recall in a satisfactory manner will stimulate him to make as many associations as he can think of during the process of learning the lesson. The recitation is much more for the student than a check on his work. It is a drive, a motive, pressing him to prepare his lesson. The type of drive, or motivation, it provides corresponds to the type of recall the recitation demands. Of this point every student is highly conscious.

The act of recalling reveals errors in learning and hazy and indefinite impressions. The act of reciting is of great value for the same reason. The act of reciting involves recall that is selective. From the memories the student can recall, he must select the items which fit the requirements of the recitation. In his effort to recite, he sometimes discovers that although he can recall much he can recall little that bears on the lesson to be recited.

Memory is confused by suggestion. For the student to profit from his effort to recall, his recitation should in the main be of the straightforward narrative type instead of the question-and-answer type. When the student is unprepared to recite narratively, he is perhaps hindered the least in his recitation if the teacher does not try to help by questioning him. If, instead of questioning him, his teacher sets him to work preparing the lesson he had failed to prepare, he escapes the confusion of suggestion, and, at the same time, learns a lesson in self-reliance. It is appropriate and often necessary, of course, for the teacher to question as a means of discovering the points at which the student is having difficulty. But, generally, the teacher should ask few questions while the student is reciting. As a rule, teachers are inclined to ask too many questions during the recitation. They should require the student's recitation to take the *narrative* form and to deal with large units, rather than to take the *interrogatory* form, which must necessarily deal with small items in greater or less isolation.

Memory makes new adjustments possible. Our discussions of the use and value of memory as a means of enriching present experiences, and of vivid, meaningful impressions as the best aid to memory, may be summarized in the statement that the systematic recall of past experiences helps to make possible new adjustments to environment. The systematic recall of past experiences provides the basis of planning for new adjustments. The past experiences are the materials of the plan. Whether a plan is mapped out depends, of course, on the use of the materials, once they have been recalled.

Recalling a number of past experiences and bringing them more or less simultaneously into the focus of attention usually results in some degree of mental disturbance. Experiences, coming one by one, do not associate and, hence, do not conflict. Experiences, recalled one by one, do not associate and do not disagree. But when we look at several experiences together, comparing one with another, we are apt to find them not in entire agreement with one another. Each one seems to give a degree of denial to the others. Yet we know that we once had all these experiences. We feel that each must be true. How is it that they contradict? This is a new problem, a problem that has just come to light.

The sensing of a problem—that is, the realization of a disagreement among experiences when it seems no disagreement should exist—puts doubt in our minds, and sets us at the activity of taking a new view of our experiences. Doubt in the mind demands a clearing up. Accordingly, we set about resolving the disagreements. We do this by giving the past experiences an arrangement, a reorganization, that seems to bring them into agreement. This reorganization is a new way of relating the experiences, each to all the others. As a result of the reorganization, we discover in the experiences common elements we heretofore did not realize existed. These common elements are the substance of new ideas. Having begun with a problem, we arrive through reorganization at a solution in the form of an idea, or ideas, we never before possessed.

A new idea is always an incentive to new activity. It is a new plan of attack upon the external world. All that remains, once we have it, is to try it out. In other words, when we obtain what seems to be a solution of our problem, we have another step to take, the step of checking the solution against the conditions of the practical situation to which it relates. If the solution checks, we have a new means of dealing with questions that confront us. If there is no check, we can return to the memories of past experiences and begin again with a different organization that may lead to a different idea, or a different solution.

Summary. Our discussions of memory center in the following points:

1. Memory enriches present experience.
2. Memory is less helpful than present meaning.
3. Memory is a first step in developing present meaning.
4. Memory work does not guarantee the development of present meaning.
5. Memory work can be avoided through training in the use of things.
6. Memory gives flexibility to present meaning.
7. Memory is aided through vivid impression.
8. Memory is aided through association.
9. Memory is aided through recall.
10. Memory is confused by suggestion.
11. Memory makes new adjustments possible.

Chapter 9

Feelings and Emotions

Purpose of the chapter. Preceding chapters have referred to the fact that what appears externally to be the same experience for two given individuals actually turns out to be two quite different experiences. These chapters have indicated that the way an individual looks at the world is as important a determiner of what he sees as is the physical scene which the world presents to his view. Implicit in all the discussions has been the part that is played by personal attitudes and feelings. It becomes the task of the present chapter to make the role of personal attitudes and feelings the subject of explicit discussion.

Feelings are bodily conditions. The term "feelings" refers to the general tonal condition of the whole body. There is no particular site in the body which locates the feelings. We may locate a bodily pain, but for the general feeling of unpleasantness that accompanies it we are unable to find a definite source and location. If one has a toothache, for example, the source of the pain is in a definite location, but the accompanying feeling seems spread throughout the whole body. Further, the pain itself does not seem to be confined to a fixed position. When one tooth aches, several others seem to ache at the same time. We may especially note the general spread of the more intense feelings—rage, anger, and fear. Because of the circulatory and respiratory changes and muscular tensions that accompany these feelings, the general tonal condition becomes obvious. When a person is enraged, his face is suffused with blood; when he is angry, his breath comes in gasps; and when he is afraid, his muscles tense.

The effect of a definitely located bodily pain on the general tonal condition of the whole body may be illustrated by the difference in efficiency of an automobile when the engine is smooth-running and "in tune," and when it has a "knock." In the former instance, the smooth-running efficiency of the engine transmits by perfect gearing to all the moving parts. In the latter instance, the knock in the engine transmits in a general lowering of efficiency to all the moving parts. The source of the difficulty is in a definite location, but the result is generally diffused.

When the bodily mechanism is, as it were, in perfect gear; when the internal organs function with perfect timing; when the person is fed, and bathed, and clothed; when he does not have a care; when memories of past experiences raise no disturbing doubts—the person has a feeling of well-being, which is generally diffused, and which affects stimulations that come in from the outside world. For such a person, the outside world takes on a beauty or an agreeableness that it does not otherwise possess. The friend he meets exhibits unusual amounts of the human attributes of friendliness; the air he breathes is peculiarly exhilarating. And, if he may not hear the song of the lark, the chirping of the sparrow is far from disturbing. Very different are the results of stimulations that enter the central nervous system at particular points when the internal bodily mechanism is not thus in tune. The external world now is drab and dull. The voices of friends grate on the ear. The odor of flowers sickens, and the taste of food nauseates. Feelings are the tonal conditions of the whole body, whether the well-being or the disturbance of a given part affects the whole, or the well-being or the disturbance of the whole affects a given part.

Feelings are complex conditions. The contrasting feelings of pleasure and displeasure join in complicating the contrasting feelings of tension and relaxation and of restlessness and quiescence. The contrasting pairs are not always comparable. Melancholy and terror are unpleasant; yet the former depresses, while the latter excites. With the feeling of pleasure there is sometimes tension, sometimes relaxation, sometimes excitement, and sometimes a depressed feeling. With unpleasantness there are at different moments relaxation, tension, excitement, and depression.

The feeling of pleasure may be either one of contentment or one of discontent. To illustrate, let us picture two students who have prepared their lessons, or who have passed a difficult examination, or who have brought an experiment to a successful conclusion. Both experience a feeling of pleasure with the success that has crowned their efforts; but one is contented with his success, and the other feels a sense of discontent. The one is satisfied, because for the present moment at least he is not looking beyond his immediate accomplishment; the other, having just finished one task, is already looking ahead to the one that is to follow. The latter student may have encountered a question in his examination that has aroused a doubt in his mind about the relevancy of certain information he gained in preparing for the examination; he may have located in preparing the lesson an interest he feels impelled to pursue in the next lesson; or he may have found in performing the experiment that it raised questions that seem worth trying to answer in a succeeding experiment. The latter student may be no better student than the former. Yet, because for him intellectual restlessness instead of complacency is the companion of pleasure, he is started on the road toward scholastic superiority. The former student has pursued an interest until he has caught it, and he is both pleased and satisfied. The latter student has pursued an interest until he has caught it, but in catching the interest he has been attracted to interests ahead, not hitherto seen, and he is both pleased and restless to move ahead. Herein is the secret of an individual's success, whether he be student or teacher, businessman or scientist. The successful individual is not merely industrious enough to keep at his task until he completes it in a way that brings pleasure and satisfaction; he also is fortunate enough or alert enough to discover in each task interests that disturb his complacency and beckon him on to a new task.

Feelings may be cultivated. The fact that the feelings are internal tonal conditions has suggested the belief that they are hereditary, not subject to change, and more or less instinctive in nature. It is true that some people are stolid and some are high-strung, that some are phlegmatic and some restless—indeed, that individuals differ widely in the temperaments they possess. Yet it is equally true that the feelings of a person at any given moment are as much the product of his environment as they are the result of his inherited capacity.

We do not need to go beyond the schoolroom for illustration of the fact that feelings respond to training. We may consider, for example, the feeling of confidence of the succeeding student in his ability to handle a new assignment. This feeling he did not always have. It is the product, either wholly or in part, of his school training. He may have had as his teachers persons who knew both the subjects he had to learn and his immature abilities in these subjects, and who assigned him tasks that were within the limits of his abilities. His teachers, having assigned a task he could perform, probably saw to it that he performed the task to the best of his ability. As a result, the student has acquired in some small degree the habit of success. Successful work in his subjects has been his past experience. Success has carried with it a feeling of pride in accomplishment, and also a feeling of confidence in his ability to perform the next task when he meets it.

The failing pupil possesses quite different feelings toward his assignments. His teachers may have given him assignments that were beyond his ability, or they may not have seen to it that he prepared his assignments to the best of his ability. Whatever the cause, his school record has been a record of failure. His resulting feelings are not simply neutral in respect to a lack of confidence. They are powerful feelings that are distinctly negative in character. Perhaps from time to time this student mustered his energy to perform an assignment, and found that he could not use his energy to any effect because the work was beyond his ability to understand and perform. This energy turned back into his body and produced the inner agitation of disappointment. Or perhaps he mustered his energy and used it without success. In either case, he came to the end of his performance with his energy spent, but with no feeling of the exhilaration that helps to release a new supply. As a result, his feeling was one of mental exhaustion. Whatever were the details of his past experience, the failing pupil has learned to approach a new task with a feeling of inner shrinking. This feeling is as much a result of training as is the feeling of confidence of the successful student.

The training of sympathy is another illustration of the fact that feelings respond to training. Sympathy grows from the tendency to imitate. When we see a runner putting forth a final burst of speed to reach the tape, we tend to share in the activity. The ball carrier who threads his way through the players of the opposing team arouses in the spectators the inner feeling of similar activity. The speaker who effectively proves his point leads his audience to think as he does. The feeling of sympathy results from the attentive following of another's activity.

Training in any given activity enlarges the feeling of sympathy. The spectator who does not understand the game does not follow with his attention the player around whom the play is centered. The listener at an address who does not understand the topic under discussion fails to listen at the vital points. Neither the spectator nor the listener follows the performer with his attention, and neither is sympathetic with the performer's effort. When the spectator does become familiar with the fine points of the game, and the listener with the issues of the discussed topic, their attention and sympathetic internal activity increase.

Feelings are affective. The way a person feels determines in considerable degree the way he thinks and acts. Feelings are the cause of thought and action as well as the result of thought and action. For example, the sympathetic teacher—that is, the teacher who internally faces the pupil's difficulty somewhat as the pupil has to face it and thus puts himself into the situation of the pupil—will of necessity thoughtfully adjust to the pupil's preparation and ability the tasks he assigns. The sympathetic humanitarian plans and acts in order to promote the general welfare of his fellows in society, especially of those who are less well-favored than he. The sympathetic conversationalist sees the opposite view of his fellow conversationalist and is inclined both to suspend and to modify the judgment with which he begins a discussion.

The relation between feeling and the efficiency of thought and action is evident in the daily routine of the school. The manner of attack upon an assignment by the pupil who has a feeling of confidence stands out in marked contrast with that by a pupil who is hesitant and discouraged. The one has a feeling of eagerness, and the other has a feeling of inward shrinking. Though the former pupil may much prefer a game of ball or a session at the picture show, he will attack his task—though he may have to be set at it by a more mature person—with a degree of energy the latter seems unable to muster. Much of the energy of the latter pupil dissipates in the often vain effort to overcome his inward feeling of withdrawal from the task at hand.

The effect of feelings upon thought and action is in proportion to the intensity of the feelings. If they are mild or of low intensity, their effect is correspondingly small, and they may neutralize in other conditions of the total situation. If they are intense, their effect is correspondingly great, often so great as entirely to change the coloring and influence of other conditions. We now turn our attention to those intense feelings we commonly call the emotions.

Emotions are intense feelings. The simpler feelings, such as the ones we have been considering, are a part of a person's daily routine. They come and go, and they generally leave no mark in a person's memory. They are matters of his everyday experience. They are a part of the conventional life he is accustomed to live in society. They are the internal conditions of his person that he takes for granted as the usual and the expected.

In sharp contrast with the everyday experiencing of the simpler feelings of pleasure and unpleasantness, of quietness and restlessness, of relaxation and tenseness, are the periods of storm and stress, of emergencies, of intense disturbances. Such periods pull a person in all directions at once. They put him in a state of uncertainty, so that he does not know which way to turn. They confuse his thinking and make his actions ineffective. They are the moments when disappointment depresses him, when anger overwhelms him, when fear paralyzes him, when grief bows him down. The experiences of such times are emotional.

Emotions are internal confusions. An earlier discussion pointed out that marked circulatory and respiratory changes and muscular tensions accompany the intense feelings of emotions. It is a common belief that these changes and tensions result from the emotions. We commonly conclude that a person's face becomes suffused with blood because he is enraged, that he breathes in gasps because he is angry, and that his muscles become tense because he is afraid. We consider trembling of the knees, palpitation of the heart, sinking of the stomach, and similar manifestations the results of the emotions that accompany them.

About 1890, William James, of Harvard University, and

Carl Lange, a Danish psychologist, working independently of each other, suggested a different theory. They suggested that the organic disturbances that accompany the emotions, instead of being results of the emotions, are in reality the causes of the emotions; indeed, that they *are* the emotions. They explained that we feel sorry because we cry, angry because we strike, afraid because we tremble, and so on.

A person does not have to accept in its entirety the James-Lange theory of the emotions to recognize the intimate relation between organic disturbances and emotions. In whatever degree each may cause or result from the other, the significant fact remains that in considerable degree emotions are internal confusions and internal confusions are emotions. If a person has found an explanation of the one, he has found an explanation of the other.

An important explanation, perhaps the chief explanation, of internal confusions was given in an earlier discussion of the feeling of disappointment. When a person musters his energy for the performance of an activity, for example, and some circumstance intervenes to prevent him from performing the activity, the mustered energy that is not used moves back into the body. The energy that turns back into the body produces an inner commotion, which in this instance is the feeling of disappointment. It is such internal agitations that are the emotions. To illustrate, when a high pressure of steam in a boiler sets an engine in motion, it does not build up in the boiler in explosive amount. If, however, the high pressure is not turned on when it is ready to run the engine, but is permitted to accumulate in the boiler, it produces an unusual amount of internal strain which may result in an explosion.

Emotions arise out of emergencies. The ordinary situations of life stimulate energy in ordinary amounts. If this energy turns into action, the accompanying feeling is one of pleasurable well-being. If external influences inhibit action, the energy thus unused turns back into the body and produces an inner commotion of no more than ordinary disappointment. On the other hand, the extraordinary situations of life—the situations that require sudden action, the situations that develop rapidly—stimulate large amounts of energy. Often the emergency is so great, or the situation is so demanding of immediate violent action, as to call into use a person's reserves of energy. Now if vigorous productive activity uses up this energy, the accompanying feeling is one of intense exhilaration. But if external influences inhibit action, the unused energy turns back into the body and produces an inner agitation that may be one of considerable violence. Thus two conditions cause emotion: (1) the stimulation of abundant energy, and (2) the blocking of action which dams up energy in the bodily machinery.

The sudden emergency, the rapidly developing situation, that calls out large supplies of energy may be real, or it may be imaginary. To illustrate, suppose a person is crossing the street when out of the corner of his eye he sights a rapidly approaching automobile and hears the screech of brakes and the raucous warning of the horn. At once, without thought, without the time for thought, all his energy is available for vigorous action. He sees a clear passage to the sidewalk, and, releasing his energy, he jumps to safety. There results a feeling of exultation in successful accomplishment. He remarks perhaps to a friend who is passing, "Did you notice how far I jumped?" Here the emergency is a real one.

Now, let us suppose, the person who has just had this exhilarating experience has forgotten for the moment his errand in crossing the street. He stops on the sidewalk to get his breath, and reconstructs the experience he had in the middle of the street. He sees again the approaching car and again hears its warning sound. Again, energy is available for sudden vigorous action. Since the situation now is imaginary, there is no need for real action. Moreover, let us say, the person imagines himself again in the street, but this time he sees in his imagination no place to jump, no way to remove himself from approaching danger. Still more energy is available for use; and still more is blocked by no occasion for action. This pent-up energy produces no small degree of internal agitation. The heart palpitates; chills run up the spine; cold sweat breaks out; the knees tremble—the individual is in the grip of fear. Here the emergency is imaginary; it is not a real emergency.

Emotions are caused by blocked adjustments. Though the emergencies of life, the suddenly developing, strange, and extraordinary situations, provide the basis for the onset of emotions, they are not necessarily the contributing cause. An emergency merely sets the stage. The succeeding drama is played by another factor. We have seen that when the stimulation of an emergency results in definite action, there is no resulting emotion; but when action is blocked, even temporarily, emotion follows. The determining factor is the blocking of adjustment. Ignorance or uncertainty about how to meet the emergency, or inability to act, is the cause of the blockage.

If we hold the nose of an infant or otherwise inhibit his activity or desire, he feels the emotion of anger. The infant does not know what to do in the strange circumstance. He is unable to act to meet the unusual situation. A person in a social gathering that is made up largely of strangers often suffers at least a temporary embarrassment. He is somewhat uncertain as to the type of behavior that is considered conventional. The speaker feels his heart palpitating and his knees trembling just before the time for his address. In his imagination he sees in advance the situation of addressing his audience, of having his speech received more or less unfavorably or apathetically, and of feeling uncertain about the manner of adjusting his remarks to the reception of his audience. Before his introduction, he can do nothing to meet the situation thus conjured up. The angry man is not angry because someone taunts him, but because he is unable to respond to the taunts. The passenger in a storm at sea becomes frightened, whereas the captain of the ship, who is much more keenly aware of imminent danger, is not afraid. The passenger's preparation for energetic action is blocked; he does not know what to do. The captain is not merely active; he is giving his actions intelligent direction.

Emotions obstruct clear thought and definite action. Teachers in the schools have long been aware of the great difficulties in learning of pupils who are emotionally disturbed and maladjusted. Whatever the causes of the inner turmoil, such pupils cannot concentrate their attention and efforts upon their lessons. Other interests stimulate their energy for use in directions other than the performance of their schoolwork. The circumstances of the school program bottle up this energy and thus disturb the application of what little energy they have to give to the task at hand. The angry player on a team is not an efficient player. Though stimulated to extraordinarily vigorous activity, his vision of the play to be executed is clouded, and his energy is dissipated in ineffective effort. The worker in industry imagines the day when he must relinquish his job to a younger person and imagines himself as unprepared to provide for himself in his old age the necessities of life. His thoughts stimulate energy he cannot use, and produce tensions which interfere with his present duties. The internal confusion of emotion disturbs effective action in thought and deed.

Emotions do not appear in clear thought and definite action. We may imagine another set of circumstances for the worker in modern life and industry who turns his thoughts to the time when he will be old. As he thus turns his thoughts there is a quickening of impulse to action. But let us suppose that, instead of conjuring up a state of unpreparedness for his old age, our worker gives thought to his growing understanding of the industry of which his present trade is a part and to the probability of his advancement step by step to positions of larger responsibility for which he has been preparing himself. Let us suppose, too, that our worker remembers that little by little he is building up the savings which will insure a modest livelihood when old age comes. Our worker in the present instance does not suffer from the debilitating emotion of fear. Instead, he experiences a thrill of satisfaction. He does not fear the coming of age. He has planned to take care of the lowered physical efficiency that comes with age. He has thought and acted in preparation for its onset. In consequence, he has prevented the development of inner confusion which would otherwise result.

Intelligent preparation for the emergencies of life guarantees against emotional disturbance. The player who is prepared by training and experience for any of the eventualities of the game and is confident of his ability to do the right thing at the right time is not overcome with internal disturbance. The speaker who has studied all sides of his subject in advance and is confident that he knows how to present and illustrate his points is not fearful. Clear thinking in advance prevents the rise of preliminary emotion, and definite action in developing his subject when he is on his feet leaves no available energy to be turned back into his body to cause inner turmoil. Extended preparation by the student of all the lessons in his course and a rational organization of what he has learned does away with the possible fear of an examination. Preparation for his trade and continued study in preparation for advancement in his trade provides confidence for the worker and removes one cause of emotional disturbance. Preparation for what is to come provides a conscious guarantee against the blocking of the efforts a person needs to put forth to meet the unusual situations and the future situations in his life.

Emotions result in moods and prejudices. When an emotion has run its course, when the highly stimulated but blocked-in energy is finally absorbed, it leaves behind a more or less permanent result. No longer, of course, must the internal bodily mechanism resist the pressure of the turned-in energy; but the effects of the internal resistance to the pressure remain. The internal mechanism has strained itself, as it were, out of its usual shape. It is not sufficiently resilient to spring back at once to the normal.

The feeling that follows an emotion is one of exhaustion, of depression, a kind of letdown feeling. It is a mood, an attitude, a point of view, never before possessed. The feeling attaches to the situation within which the emotion was experienced, or to the circumstance that served as the immediate cause by blocking activity, or to some other element of the total experience to which the individual gives the credit or blame. The feeling is one of prejudice, of definite set toward one type of activity or against another. The mood, or the attitude, or the prejudice, is a strong deterrent to rational thinking. A person is not inclined to consider a matter when from the outset he has a well-defined point of view toward it. He does not see the issues in a situation when from the outset he feels that he has the answer. Besides, when he does engage in rational thinking to the point where he sees the unreasonableness of his prejudice, it still persists as an active force.

Moods and prejudices are more than mere results of emotional stress and strain. They are the starting points and the contributing causes of new emotional disturbances. The experiencing of fears leaves a tendency to experience new fears. We may recall that the starting point of an emotion is a rapidly developing situation that is either real or imaginary. The mental attitude resulting from fear is highly imaginative and can readily create an imaginary situation that will finally result in a new fear. The pupil, for example, who has experienced the fear of failure in a given subject can very easily create for himself situations that produce new fears in a subject in which he is about to enroll. Fits of anger leave behind a tendency to become angry again. High emotional enthusiasm results in a bodily set or attitude toward other circumstances that may arouse emotional enthusiasm.

Feelings and emotions are a major concern of the school. The school may not alleviate the circumstances of life that block the normal uses of energy, but it can prepare its pupils to anticipate certain of the difficulties of life and to work their way out of them and around them. For the aimless and temporary pleasures of pupils, the school may help to substitute pleasures on a higher level and of a more permanent kind. The pupil who learns to find pleasure in reading, in music, in mathematics, in manual arts, and the like, fortifies himself against many of the stresses and strains and mental shocks that he would otherwise suffer. The pupil who takes exercise day after day in clear thinking and in definite, systematically guided activity, mental as well as physical, prepares himself against the onset of situations that would otherwise block activity and lead to emotional disturbance. He also gains the best possible antidote for any such disturbance that he may encounter at the time. The tonal condition of the pupil tends to tune in with the tonal condition of the school.

Summary. The experience that accompanies behavior is in the nature of a general tonal condition of the whole bodily mechanism. As such, feeling is the result of behavior. On the other hand, behavior takes its form and color from the attitude of the individual toward the situation that stimulates the behavior. In this manner, feeling is a contributing cause. When external force or internal unpreparedness inhibits or blocks behavior, the energy that is available for use turns back into the body where it produces the inner turmoil of an emotion. Our consideration of the nature of emotion and of its relation to thought and action, as well as of certain of the characteristics of the simpler feelings, has developed under the following points:

1. Feelings are bodily conditions.
2. Feelings are complex conditions.
3. Feelings may be cultivated.
4. Feelings are affective.
5. Emotions are intense feelings.
6. Emotions are internal confusions.
7. Emotions arise out of emergencies.

8. Emotions are caused by blocked adjustments.
9. Emotions obstruct clear thought and definite action.
10. Emotions do not appear in clear thought and definite action.
11. Emotions result in moods and prejudices.
12. Feelings and emotions are a major concern of the school.

Chapter 10

The Integration of Behavior

Purpose of the chapter. The efficiency of a person's acting and thinking depends upon the way he brings them into coordination. His physical health is a condition of harmonious functioning of all the vital organs of his body. His mental health is a condition of harmonious relation of his thoughts and feelings. Yet behavior is not usually in good balance. In so complex a being as man, maintaining his existence in a complex social order, there is large possibility for unintegrated behavior which reflects itself in the inner turmoil of emotion. Ignorance, lack of adjustment, and inhibited tendencies are sources of confusion. But when behavior integrates, it reflects itself in satisfactory adjustments and in a general tonal condition of fitness to meet new situations. Confidence, exhilaration, and guided effort are sources of efficiency.

As children and youth grow older, the situations of their lives grow more complex and their duties and obligations increase. In consequence, they encounter increasing possibilities of unsatisfactory and uncoordinated behavior. The preceding chapter showed, for example, how new fears develop out of the conditions of modern life. Children and youth also encounter increasing possibilities of pleasurable and coordinated behavior, in newer forms, on higher levels, and in more comprehensive scope. The higher forms of play activity illustrate this fact. So do the higher types of interest and the aesthetic pleasures of the trained individual.

The preceding discussions have mentioned here and there the conditions of integrated behavior and the situations that encourage its development. It seems appropriate in this chapter to make the integration of behavior the subject of explicit discussion. Accordingly, the present chapter has a two-fold purpose: (1) to give further consideration to the general character of integrated behavior, and (2) to suggest certain ways by which a person may bring some of his acts and thoughts into an integrated whole.

There are various levels of integrated behavior. In discussing the education of children and youth, many persons have overworked the term "integration." They have used it to indicate the type of planning they think the teacher should make as a guide for the lessons he teaches. They have used it to refer to the kind of curriculum they recommend for the school. They have used it to denote the character of the activities they wish pupils to undertake, and to describe the product they believe will result from these activities. Thus, they seem to say, the "integrated" curriculum in the "integrated" school will set up the "integrated" learning activities which will produce the "integrated" pupil with an "integrated" personality.

There is nothing incorrect in the belief that the goal of education is the integrated personality. But there is much at fault with the teacher who holds to the belief, but fails to understand that it is a generality. Such a teacher is more apt to be a misguided worshiper of a cult than an intelligent director of the learning activities of pupils. Such a teacher is likely to be satisfied with any level of behavior and with any order of personality so long as the behavior and the personality may be said to be integrated. Such a teacher may never give consideration to the fundamental fact that integration takes various forms and acts in various ways. It is highly proper for the teacher to conceive of the goal of education as the integrated personality if he can think of his pupils both in terms of what they are and in terms of what they may become.

There are various levels of integrated behavior. The integrated personality has no fixed level of thinking and feeling. Harmonious cooperation of physical functions and of thoughts and acts is of low order as well as of high order. The moron under an appropriate institutional regimen is an integrated personality. His desires are few, his wants are simple, and generally he does not have a care. His world is a world of simple sensory experiences. His capacities are equal to his needs. The healthy infant is an integrated personality. So, farther up the scale, are the artist and the scientist, each losing himself in the engrossingly interesting labors of his craft. The artist sees in his world, or in a corner of it, a new manifestation of order and symmetry and harmony and beauty, and with his mastery of words, or sounds, or lines and colors, he interprets what he sees in poetry, or music, or graphic art. The harmony he sees in the world and expresses in his art is the harmony of conception and feeling within him, the harmony he has cultivated in parallel with his technique. The scientist at his work brings order and consistency into the universe, or into that part of it which is the subject of his special interest. All the natural forces and phenomena that seem to the ordinary man so much in confusion, the scientist relates into a consistent scheme, and he uses the organization he thus perfects to throw light upon an ever-widening circle of the known. His ideas and his techniques harmonize in the pursuit of solutions to his problems.

Integration is not the sole criterion for judging behavior. There is a criterion other than integration that is perhaps of equal importance for the judgment of behavior—the criterion of level or order. We may designate it as the criterion of efficiency, or the criterion of better adjustment.

The activities that teachers set up for their pupils may illustrate. In one school, we find the primary pupil engaged in sorting out and arranging the multicolored sticks on his desk. He places the red sticks in one pile, the blue sticks in another, and so on. For the time his whole attention is upon the task at hand. For the time his behavior follows the requirement of his task. In another school, we find the primary pupil making an apparently similar arrangement of the sticks that are on his desk. But this pupil has a different purpose. His task is to separate his ten sticks, let us say, into as many different sets of three piles as he can, and to express in writing the result of each separation. He discovers that two and three and five are ten, that three and one and six are ten, and so on. As he proceeds, he develops a better idea of ten and of its relation to smaller groups that compose it. The behavior of this pupil is as integrated as the behavior of the first pupil, but the integration is of a higher order. Again, in one school, the pupils construct a play post office in the corner of the room, and pretend to engage in the activities of postmen and mail clerks. Under guidance, the behavior of the pupils may be well organized. In another school, the pupils give attention through extensive reading and orderly discussion to a wide range of activities of communication, not only as they are carried on at present, but also as they were carried on in earlier times and in simpler societies. These pupils experience much more difficulty integrating their activities than the pupils first mentioned. They may experience more failure. Yet their integration of behavior is of a higher order. It represents better adjustment to the total situation. And again, we find one high-school class in geometry engaged in drawing, coloring, cutting out, constructing, and labeling various geometrical designs and figures. In contrast, we find another class following the steps of logical proof of a theorem in their textbook or seeking to discover the sequence of steps of the proof of an original. Often it is difficult to say in which class there is the more organized, integrated behavior. It is not difficult to determine in which class the integration is of the higher order.

Spontaneous behavior is integrated behavior. The imitative play of children is integrated behavior of a lower order. It is the natural expression of energy released by instinctive demands which for the moment have no competition. It calls into use all the bodily functions that are needed to produce the imitated activity on the play level. It is not marred, at least at the time, by any degree of critical insight into its deficiency as compared with the real activity being imitated. Both the girl at her housekeeping and the boy with his airplane toys are bringing into harmonious coordination a multitude of bodily activities and mental processes. Each is a "whole child" in action.

The spontaneous behavior of children is very helpful in their development, for it provides practice in integration. Though the integration practiced is on a lower level, its practice is a steppingstone toward the higher types of integration which the older generation seeks to help children to attain. The spontaneous behavior of children is thus more than a mere release of pent-up energy. It is a stimulation and a preparation for the higher forms of integrated activity that children may later undertake.

New situations disrupt the organized states of behavior. When a person's behavior becomes organized and integrated at any given level, it tends to remain so under the ordinary and everyday circumstances that produced it. But when a person meets situations that are new, his behavior is thrown out of gear. The new situations are a disturbing influence. The disruption that accompanies the child's entrance into the primary school is a case in point. The child, accustomed as he is to the established routine of the home and to freedom for the activities of imitative play, comes into the new situation of the school. In the new environment, a multitude of things and activities make demands that are both impressive and strange. They pull his attention in many directions at once. They make him uncertain about how he should respond. He is sometimes excited, sometimes depressed. He is upset, physically and mentally. He does not relax in restful sleep. His established routine is out of gear. He suddenly changes from an integrated to an unintegrated personality.

Similarly, but usually in less degree, the more mature individual is disturbed by new situations. In a sense, however, he has become used to new situations, and frequently meets them by ignoring them. This is what a person must learn to do as regards many of the demands of life that are relatively trivial and unimportant. But the ignoring of vital issues by the more mature individual is an exhibition of a low level of behavior and an evidence of cessation of growth. Besides, there will be some new situations and some issues in life he cannot dodge. They will disrupt his established processes of behavior. They will disturb what has come to be for him the normal functioning of physical and mental processes. The mature individual knows that he is going to be distracted by new situations, and he learns in some degree how to anticipate them. Anticipation itself is distracting, but the mature person finds that he profits if he distracts himself to some purpose while he learns how to master distractions.

Directed behavior leads to higher levels of integration. In an earlier discussion we considered the point that the effective lessons of the school are as much lessons in paying attention as they are lessons in reading, arithmetic, history, or geography. The teacher directs attention to the essential features of the arts and skills the pupils must learn—the meanings of words, the systematic arrangement of objects, the lives of people of other times and lands. The teacher sets the stage for the pupils to be actively attentive, and stimulates and guides them to pay attention to the task at hand. As a result, the pupils gain new interests and new motives which take the place of older ones; they learn the arts of intellectual play which substitute for imitative play. The intellectual play the pupils learn in school is in every respect as stimulating as is spontaneous play. It is of more lasting benefit, it does not cloy, and it is at once an achievement and an incentive for further achievement. Moreover, it is a new, a more mature, and a higher type of integrated behavior.

The guidance the teacher gives to pupils is not the control of repression. Repression, as we have seen, blocks the discharge of nervous energy and turns it back into the body where it sets up the inner confusion of emotion. Such control, instead of aiding the integration of behavior, actively contributes to disintegration. The guidance which the teacher gives must be positive. Just as a person can control the movement of one muscle by contracting an antagonistic muscle, so he can control an action by doing something else. Similarly, he can allay one interest by developing other interests, and suppress his thoughts along a given line by thinking of other things. Thus, to replace the child's spontaneous integrated activities which going to school has thrown out of gear, the school substitutes other activities which may lead to mental and physical processes that never come from purely natural behavior.

Normal social relations are a condition of mental health. Learning to play and work with others disturbs the normal behavior. It also helps to overcome disturbance. To illustrate, the presence of other children multiplies the conditions which attract the child first one way then another; yet it makes necessary personal adjustments and controls. In a group of children any given child cannot have his own way all the time. He must regard the rights of others. He must not trespass on the privileges of others. He must take his turn. As a consequence, attention to his own desires and actions, which to him are very important, must give way for attention to the desires and actions of others, which to him are matters of less importance. This partial forgetting of himself in order to think of others gives a better balance to his evaluation of himself and his fellows. It also provides a better balance in his behavior.

A prevision of new situations may be helpful. Before a person meets it, he can imagine a situation, or a task, or a difficulty. He can see in advance what its demands are apt to be. He can try out in imagination first one way of meeting it, then another; and he can observe, also in imagination, the differing results. Thus a person is able to prepare in advance for the situations he is apt to meet. Having in mind the probable results of different plans of action, he can choose the plan which seems preferable. Prevision, if one can have it, may be a helpful aid.

On the other hand, prevision of new situations may be a source of distraction. When in imagination we "cross bridges before we come to them," we do not usually gain assurance and satisfaction from the experiences. Such prevision we may avoid through right training in prevision.

For example, in the well-ordered school, the teacher lays out the activities for the pupils, and manages them, according to plan. The planning is the teacher's, for the teacher determines the general pattern in advance. The planning is also the planning of pupils, for at each step the teacher and pupils plan together so that the pupils will know the plan and have a personal interest in following it.

The plans thus made take into account not only the choice and the setting of tasks, but also periods for rest and recreation. They provide orderly sequence for the tasks and for changes of work. The immediate result is avoidance of the distractions of fatigue and concentration upon the task at hand. The result that is not so immediate, but that is nevertheless important, is that the pupil learns gradually what to expect. In other words, he learns something about plans and planning. The pupil is thus gradually inducted into the activity of making some of the plans himself.

It is excellent training for the pupil to learn how to order his own work. He can be sure that difficult situations are ahead of him. He cannot prevent a prevision of them. To avoid the distractions of unprepared prevision, he must be trained in the making of planned previsions. Well-ordered plans that are persistently followed by the teacher provide an excellent pattern for the pupil's plans.

Whether the planning is the teacher's or the pupil's, for best results it must be made and understood in advance. If the planning comes late, it may hinder rather than help. For example, while the pupil is pursuing a task, he cannot afford to use energy to decide when he should have a rest period or a change of work. To think of such things turns his attention away from the task at hand to his own feelings. Once he begins to examine how he feels, he will create for himself all sorts of imaginary feelings, and he will exaggerate these feelings out of all proportion to their importance. As a consequence, he is apt to find himself wearied with his task, in a state of ennui or imagined fatigue, before he is well begun. The pupil's feelings should be taken into account. But this should be done before the task is undertaken, not after it is under way.

Good planning is valuable not merely as a means of avoiding distraction, but also as a means of gaining concentration. What one is about to undertake he should understand in advance, and he should also muster in advance the effort to carry it through. If, while he pursues a task, he starts thinking about the need of concentrating his attention, he may find himself giving half his attention to his attention itself and the other half to his work. His effort to gain attention at the wrong time may merely divide such attention as he has into ineffective parts.

Preoccupation with present tasks reduces distraction. The practice of doing his work on scheduled time trains the pupil to concentrate attention upon the task at hand. It conserves his mental energy. It keeps him from wasting time and energy in thinking about the task he should do and then putting it off. Each time he considers a task and then puts it off, he makes it take on the appearance of greater difficulty. He may, as a result, become so disturbed as to be unable to perform the task when he finally undertakes it. The practice of "doing it now" is a means of avoiding a conflict of interests, and of stimulating a calm attitude of mind toward one's work.

Preoccupation with one's present task increases efficiency. In proportion as a person saves energy by forgetting for a time his past efforts and his future responsibilities, he has a greater amount of energy left to devote to the task at hand. One ought, of course, to profit by past mistakes, and he should have in mind goals of attainment for the future. But, as the preceding topic has pointed out, he should care for such matters in his planning, not in his performing. Though attention to purpose or goal is often a stimulus, too much attention, like a New Year's resolution, makes too large an overdraft on a person's good intentions. It may, if it applies to personal values and interests, induce self-consciousness, and an egoistical preoccupation about results.

Training to meet difficulties results in wholesome attitudes. Training in the art of meeting difficulties does not come by chance. For best effect, it must be managed training. Management is necessary if the immature individual is to profit from his successes and failures, and to avoid being disturbed by them. For best results, as regards efficiency, his work should be laid out so that what he must do he will be able to do and what he must do will require him to work to the limit of his capacity. For best results, as regards attitude, work should be laid out so that he will experience neither too much success nor too much failure.

Success is necessary, if the attitude of confidence is to be built up. To this end, tasks must be easy enough to be done. But, if they are too easy, success is too easily attained, and one becomes overconfident to the point where he will not muster his best energy for the tasks at hand.

Failure needs to be guarded against, if its disturbing or depressing effects are to be avoided. To this end, tasks must not be so hard that they cannot be done. On the other hand, an occasional failure may be stimulating and challenging. It causes one to muster and to expend an amount and a quality of effort that the habit of success can never bring forth. For example, it is not to the best interests of a team either to win every game or to lose every game. The reason why a rival team is a great stimulus to effort and enthusiasm is that the rival team has won its share of past games. Again, the "original" in geometry that really arouses the succeeding student to his best efforts is the one that is too difficult for him to solve the first time, or the first half dozen times, he attempts it. Experience with failure is quite as important as experience with success.

Habit is a protection against distraction. A good habit is helpful in keeping behavior harmonious and on an even keel in both everyday situations and new and unusual ones. In meeting and dealing with the usual, ordinary, familiar situations of life, a definite habit of action lessens the enervating weariness that comes from the eternal sameness of things. The tendency to do the usual thing in the usual way is a neutralizing influence.

Habit is an organization of behavior, a developed tendency to respond in an established way to the situations which set the stage for it. Habit is a pattern of behavior which frequently is organized response to new situations also. The habit of regularity in work and play, the habit of attacking a situation with promptness, the habit of planning courses of action in advance, and other similar general habits are ready-made patterns into which new situations are made to fit. The immediate practical values of habits as patterns of behavior have already been the subject of discussion.

The higher forms of behavior lessen the distractions that attend the lower forms. Our discussions of behavior may well conclude in the general statement that integrated behavior on the higher levels is a newer and a higher order of thinking, feeling, and acting. Integrated behavior on higher levels includes and combines new meanings, better attitudes, and more efficient activities, leaving behind the older and less favorable. Earlier interests no longer attract; earlier feelings have lost their influence in the potency of the newer ones that have come to take their place; newer activities have crowded out the old. The child who once had to crawl, but now has learned to walk and run, does not return to his earlier method of locomotion. In his walking and running, he escapes the disturbances that he met in crawling. At the same time he has a different view of the world.

Summary. The problem of integration of behavior is more than the problem of merely securing it and having it. There are lower levels of integration, and there are higher levels. It is not mere integration that should be sought, but, rather, advancement from the lower levels to the higher.

The present chapter has brought together from earlier discussions the following points relative to organized behavior:

1. There are various levels of integrated behavior.
2. Integration is not the sole criterion for judging behavior.
3. Spontaneous behavior is integrated behavior.

4. New situations disrupt the organized states of behavior.
5. Directed behavior leads to higher levels of integration.
6. Normal social relations are a condition of mental health.
7. A prevision of new situations may be helpful.
8. Preoccupation with present tasks reduces distraction.
9. Training to meet difficulties results in wholesome attitudes.
10. Habit is a protection against distraction.
11. The higher forms of behavior lessen the distractions that attend the lower forms.

The task of the next chapters. The present chapter brings to a conclusion the first step in our presentation of a double view of the responses of pupils as they change from untrained to trained ones and of the activities of the school in fostering and guiding the transition. This step has been one of description of behavior and mental states and processes in general. In this step there has been provided a broad, general picture of mental activity as conditioned by the learning situations of the school. The purpose has been to furnish a view of the forest before we move up to look at the trees.

We are ready to take the second step in our presentation. This second step is one of analysis. In this step we leave the bird's-eye view of the forest to approach, as it were, a study of the kinds of trees. The purpose is to study the most important types of mental activity the learning situations of the school initiate and direct—to trace in first one way then another the transition of the responses of pupils from an untrained immaturity to a trained maturity.

Part III *Developmental Activities*

Chapter 11

Developing Skills

Purpose of the chapter. The nervous system of the human infant is a mass of unrealized possibilities. The infant may gaze at a light, or turn from it; he may listen to a sound, or ignore it; he may hold onto an object, or cast it aside. Yet not all response is thus an accident or the result of whim. Out of the mass of possibilities come, in the course of experience, a series of established responses to the situations of life, which an earlier chapter has described as habits, and a series of efficient movements, which the present chapter describes as skills.

Skills are the most objective of the trained responses the school seeks to foster. They are the most vivid evidence of the transition of the individual from an untrained immaturity to a trained maturity. They are the products of those learning activities which an observer can most easily examine. Skills, therefore, are logically the first objects of attack of the student of education who would seek to undertake an analytical study of the learning products of the school.

The present chapter treats of skills in two ways. At the outset, it considers the nature and development of skills in general, illustrating by reference to the skills which the school seeks to encourage pupils to acquire. Finally, it makes a specific skill the subject of special discussion. The discussions as a whole consider three main points: (1) the nature of skill, (2) the development of skill, and (3) the development of movement and perception in handwriting.

1. The Nature of Skill

Skill is organized behavior. A boy shows skill when he throws a ball, when he serves in tennis or returns the serve of his opponent. A girl shows skill when she wipes a dish or beats an egg. A man shows skill when he ties his shoelaces, when he drives a nail or saws a board. A woman shows skill when she threads a needle or makes a buttonhole. In all these instances the nervous system has become so organized that the stimuli that come in through the eyes, fingers, and hands pass quickly and surely into the muscles, and arouse an activity which through many repetitions has come to exhibit the certainty and precision of a mechanical process.

Skill is developed muscular coordination. In no sense of the word is it a simple movement of the muscles, or a series of simple movements in combination. For illustration, we may consider the act of writing. The adult is inclined to look upon this act as little more than the tracing upon paper of the shapes of letters which are in the mind ready for instant use. To the adult who can write no act is simpler and easier than handwriting. Yet the act of writing is a highly developed coordination of the movements of many muscles. Brought together into a single, unified pattern are the movements of fingers, hand, wrist, forearm, and arm. Each of these single sets of movements is an integrated part of an harmonious whole. Each plays its part in the production of a total movement. In addition, the tenseness and the rigidity of a multitude of muscles hold the body erect and in the proper position for easy writing. Even the muscular activity of holding the pencil is not simple, or natural. The primitive, and natural, manner of grasping an object is to fold the four fingers about it, using the thumb to give leverage to the grasp. Holding the pencil in writing position calls into use a complex system of pressures and muscular tensenesses that far transcends any single muscular contraction.

Often the adult cannot sense the complexity of his own writing movement until he begins to give attention to the difficulty of the beginning pupil who is learning to write. The child begins to learn to write by calling into play the muscles which are earliest subject to control—namely, the smaller muscles. He uses the muscles of his fingers until the movement of the pencil extends to the utmost limit of the reach of his fingers. He then stops the fingers until he has made suitable readjustment of his arm, wrist, and hand, and begins again the original movement of his fingers. Frequently he must have many special exercises involving the arm, wrist, and hand to gain suitable control of these members and to bring their movements into proper coordination with the movements of his fingers.

Skill is a condition of muscular development. Skill is a coordination of various muscular activities a given total performance requires. It is the coordination of such muscular activities as one is capable of producing. The coordination may be much lower than the performer's muscular capacity; it cannot rise higher. A stiff muscle, for example, seriously interferes with skill. On the other hand, a person's muscles may be very supple indeed and he may still be unskillful in a given performance.

Understanding of the relation between skill and muscular development has a very practical application in the work of the school. The wise teacher will not expect the attainment by the pupil of a degree of skill that is beyond his muscular capacity. The pupil in the first grade has little control of the muscular activities needed for the act of writing. The pupil at a later age will have a much higher degree of muscular development. In the first grade, as elsewhere, the pupil's skill is limited by his muscular development; in later grades, his skill will not necessarily reach the limit of its possibilities. The wise teacher sets up for the pupil the exercises that lead to an increased control of muscular activity as well as the exercises that lead to a coordination of muscular activity. At one and the same time he sets the stage for the development of skill and exercises patience as regards the pupil's immaturities and incapacities. He does not expect the pupil's skill to develop in parallel with his increasing muscular development without appropriate, guided exercise. At no point does he expect his routine of instruction and guidance to produce results beyond the pupil's general physical ability. In short, the teacher provides a program of instruction and of guidance in practice exercises, but makes it a graded program and not too ambitious at any single point.

Sensory experiences are active controls. Both in the development and in the performance of a skill sensory experiences are active controls. They serve as the guides of each separate movement toward its coordination in the total combination of movement, and they keep under proper control the whole complexity. In learning to write, the pupil is not merely concerned with holding the pencil and producing marks, but with adjusting his movement to the forms of the letters which he apprehends through visual perception. In learning to type, the pupil is not merely concerned with the pressing of the keys, but with the adjustment of his hands and fingers to the arrangement of the letters on the keyboard which becomes pictured in his mind. In learning to drive in golf, the novice must keep his eye on the ball.

Acting in conjunction with the visual controls in the development and performance of a skill are the controls of touch and pressure, which often are of greater importance than the visual. In typewriting, the touch method proves to be much more efficient than the method that depends upon visual stimulations. In sawing a board, the skilled carpenter keeps his saw adjusted to the straight line he is following through sensations of touch—through the "feel" of the saw in his hand. The novice who has to depend upon his sight of the line, because he has not acquired the important controls of touch and pressure, has great difficulty in sawing to the line. In playing the piano, tactual recognition of the positions the hands and fingers should take far transcends the visual controls the player employs. Finally, we may say that the ultimate of the artist's skill is his delicacy of touch.

Sensations of pressure guide the writer in the formation of the letters he makes. This is especially true as regards the upward and downward strokes which determine the height of the letters. As the pencil moves up it tends to leave the paper. As it moves down it presses harder and harder upon the paper. Of this we can become aware when we make the "tall" letters that rise above the line, like **h**, **l**, and **t**; the letters with tails that fall below the line, like **g**, **y**, and **q**; or the letter **f**, that both rises above and falls below the line; or when we try to make letters twice as high as usual. The skilled writer is, of course, not highly conscious of the pressure controls; neither is he totally unconscious of them. Let the point of his pencil give ever so slightly through a defect in the lead and he is instantly aware of the pressure change. Sensations of pressure are such effective controls of the skill of the expert writer that they do not require a high degree of consciousness for their effect. They can be so slight as to be almost entirely outside the margin of consciousness and still be effective. Here again is an illustration of lightness of touch, or of high degree of sensitiveness of touch, such as the artist possesses. The novice is not so sensitive to pressure and touch as is the expert, though he is equally dependent upon them. Slight sensations do not affect him; therefore, he seeks sensations considered extreme by the expert. In seeking enough of sensation to provide adequate control of movement, the primary pupil presses down hard with his pencil when he writes. He breaks the points of pencils and pens. He must have a soft, blunt pencil at the outset of his learning activity.

Various sensations cooperate in the control of movement. In all coordinated activities, it is a combination of sensations that serves as the active control. In the act of walking, for example, tactual, muscular, and visual sensations cooperate as guides. When one or the other of these types of sensations is absent, the act of walking becomes uncertain. A person does not walk with the same sureness in the dark as he does in the light. Again, in the disease of locomotor ataxia, in which the patient loses the sensitivity to touch in the soles of the feet, and to movement in the muscles, joints, and tendons of the legs, he is unable to walk without the guiding sensations of vision; and in the advanced stages of the disease, vision does not serve as a substitute for the other sensations. In writing, visual sensations cooperate with those of touch and pressure. In golfing, the player learns to rely upon much more sensory stimulation than is provided by keeping his eye on the ball. In playing the piano, the artist glances at intervals at the keyboard. In sawing a board and in driving a nail, the workman is guided in the use of his tools by both visual and muscular controls. He keeps his eye on the line along which he is sawing and on the nail he is driving. At the same time he has a distinct preference for his own saw and hammer because he has developed for these a distinct and familiar muscular feel. Similarly, each player on the ball team prefers his own bat.

Skill is adjustment to a perceptual pattern. Although skill depends upon the development of more or less simple movements and is their final integration into a single coordinated whole, skill transcends the integration of definite and particular simple movements. To illustrate, we can break down the total muscular coordination used in making any single letter of a given size into certain clearly described simple movements of fingers, hand, wrist, and arm. From this analysis we may easily proceed to the erroneous conclusion that the total movement required to make the given letter is the complex of the simple movements that stand out from the analysis. Suppose, however, that we now write the same letter twice the original size or one-half the original size. The simple movements that combine to make the original letter are in no sense of the word *exactly* the simple movements that combine to make the letter of the different size. Again, the complex of simple movements needed to write a letter on the blackboard is quite different from the complex of simple movements needed to write the same letter on paper. One can within reasonable limits adjust the paper on his desk in a variety of ways, assume various positions at his desk, and maintain throughout the same style of writing. The same style persists if he holds his paper against his body and writes from top to bottom, or if he writes with his pencil in his unskilled left hand. Clearly, a skill is not a mere complex of definitely habituated simple movements. If it were, the child who had learned to write on paper would have to learn all over again in order to write on the blackboard; the golfer who had learned to play on a level course would have to learn a new game from the beginning when he came to play on a hilly course; and the carpenter who used a certain skill to drive a nail in the weather boarding would have to use a different one to nail down a shingle.

A skill is a characteristic, total pattern of movement which is different not merely as regards different skills of the same individual, but also as regards the same skill of different individuals. Each person develops his own pattern for any given skill. Though related to the product which one may try to attain and to the product which one actually is capable of attaining, both of which he may visually perceive, the pattern of a skill transcends mere visual perception. It is chiefly muscular. There is the muscular feel of it, when one has developed it, though one cannot adequately see it in his mind's eye. Generally, the attempt consciously to picture the pattern temporarily breaks it down. Thus, when the batter tries consciously to "see" his movements as he hits the ball, or the tennis player as he serves, or the golfer as he drives, he fails in skillful performance. The pattern of a given skill is characteristically the same, regardless of the adjustments for its use under various conditions. Thus, the pattern of movement of the seamstress is the same, whether she is making large stitches or small; and the writer's pattern does not vary, whether he is making a large letter or a small one, whether he writes on the blackboard or on his paper. In other words, the pattern retains the same proportions whatever its adjustments have to be. Thus, the various strokes of a given writer's letter **f** have the same proportionate lengths wherever he may need to make them. It is this pattern that the performer develops as he develops his skill, not merely a complex of simple movements, and not at all a complex of definitely fixed simple movements. In a sense, skill is adjustment to a perceptual pattern; in a larger sense, it is the pattern itself. The development of skill, then, requires a double description: the description of a developing movement, and the description of a developing pattern of movement.

A perceptual pattern must develop. Since the perceptual pattern of a skill is largely muscular, and since it is in reality the skill itself, it cannot exist apart from movement. That is to say, in the development of a skill, one does not first of all develop the perceptual pattern and then proceed to the adjustment of movement to it. The pattern as a whole does not transcend the movement that develops; only its visual part can proceed in advance of movement.

We may state the matter in another way. At the outset of the development of a skill, when performance is very unskillful and is a mere succession of one simple movement after another, the perceptual pattern also is an aggregate of separate simple parts. Later, as the simple separate movements integrate into a coordinated whole, the perceptual pattern also develops toward an integrated totality.

Skills classify both as movements and as perceptual patterns. The discussions to this point may be summarized in the statements that skill is the adjustment of movement to a perceptual pattern, and that the perceptual pattern develops with the developing adjustment. In terms of the different types of movements and the different types of perceptual elements that combine in the various skills, we may make a classification of skills. We may distinguish three classes.

In the first class are those skills that develop by connecting movements already familiar and under control with new perceptual elements. Riding a bicycle is an illustration. The various necessary movements of hands and feet are familiar and under a fair degree of control from the outset. But the perceptual pattern of the movements in their proper relations each to the others the rider must learn. Running an automobile is another illustration. At the outset the beginner knows about and can control each of the necessary movements to press the pedals, to turn the steering wheel, to pull the brake lever, and the like. But the coordination of the movements in a skillful managing of the car the driver must learn. Also he must learn the perceptual pattern as an integrated whole.

In the second class are those skills that require the development of new and unlearned movements as well as the development of the perceptual elements that control. These skills require both the learning of movement and the learning of the appropriate perceptual stimulus. Handwriting is the outstanding illustration of this class of skills. It is the development of movement under the control of a developing perception of form. Using tools, playing games of skill, and performing various gymnastic feats are other illustrations. All such skills require a double development. All require much more than the mere practice of movement for their perfection, the familiar slogan that practice makes perfect to the contrary notwithstanding.

In the third class are those skills that are in reality an advanced type of the second class. These skills require the learning of highly complex movements and the development of highly organized perceptual patterns. Typewriting is an illustration. Though each single movement of pressing a key with a finger is very simple, the total movement is a highly complex series. Moreover, no simple description is adequate for the total perceptual pattern that develops with expertness. That is to say, the novice may learn to strike out with accuracy and speed such practice sentences as "Now is the time for all good men to come to the aid of their party," and still be unskilled. Playing the piano is another illustration of this class of skills. Here the movement and the perceptual pattern the pupil must develop are much more highly complex and highly organized than those he must develop in typewriting.

Summary. Skill is a highly complex and delicate muscular coordination that develops under the guidance and control of a perceptual pattern that in turn develops in parallel with the movement it guides and controls. This statement of the nature of skill derives from the discussions of the following main points:

1. Skill is organized behavior.
2. Skill is a condition of muscular development.
3. Sensory experiences are active controls.
4. Various sensations cooperate in the control of movement.
5. Skill is adjustment to a perceptual pattern.
6. A perceptual pattern must develop.
7. Skills classify both as movements and as perceptual patterns.

2. The Development of Skill

The learning of a skill begins with diffusion. The labored efforts of the novice at the beginning stage of the learning of a skill are far removed from the ease and grace of the skilled performer. Having a view of the performance to be undertaken, but not the feel of the performance in his muscles, the beginner confronts a situation that is far from the usual that he meets in his everyday experiences. The new or untried or unlearned situation is not unlike an emergency. To take care of emergencies and of situations that are in the nature of emergencies, the organism has certain reserves of nervous energy and the mechanism for its immediate release. An earlier chapter has described in some detail how the release of all this available energy may result in vigorous action or in the inner turmoil of an emotion. Of course, in the matter of the requirement to learn a skill, there is no such vigorous action, and no emotion, though frequently there is considerable inner confusion. There is plenty of energy for use, but no established pathway of discharge for the energy the unlearned movements require. In consequence, much of the excess energy diffuses along many pathways, and some turns back into the body to produce internal confusion. Diffusion of energy produces diffusion of movement. The beginning pupil in handwriting moves his feet; he jerks his paper with his free hand; he moves his head from side to side, and his body into incorrect and uncomfortable positions; and he grasps his pencil in a grip so tight that free movement in the tracing of his letters is impossible. The novice on the bicycle grasps the handles too firmly; he exerts too much pressure on the pedals; he turns the wheel too sharply; and in adjusting his balance on one side he throws himself out of balance on the other.

The reader may try a simple experiment to see how energy and movement are diffused in learning a skill. Place on your desk a blank sheet of paper and with pencil ready take the usual position to write. Place at the top of the page a mirror and adjust it so that you can see at the center the image of the pencil point. Cover the hand holding the pencil. Now make the necessary movements so that the letter **a** appears in the mirror in the customary reading position. Practice until you can make the mirrored **a** with a fair degree of success.

The method of learning is the method of trial and partial success. The result of the beginner's first effort is many useless movements and a partially successful useful movement. The writer produces what may pass as letters, and the golfer hits the ball only in the general direction of the green. For guidance from this point we have the slogan, "Practice makes perfect."

The slogan is misleading. Progress does not result from practice, because practice, strictly speaking, is continued repetition of the original combination of faulty movements. One does not learn a skill through practice; he does not "learn to do by doing." The reason is that what he does at the outset is far from what he must learn to do. The beginner in writing does not become expert through practicing his initial useless movements, and the novice at golf does not learn to drive through practicing the awkward and unsuccessful strokes he makes at the beginning. Actually, one learns to do only by *not doing* what he did at first. He charts the course of his learning by the ways he abandons early movements and adopts new movements which are impossible at the beginning. The course is one of trying to achieve a result and failing, of trying again and failing in less degree, and of continued trying until finally successful movement is attained. The course is one of gradual development of a unified, coordinated movement which does not exist at the beginning.

Discussions of the learning of a skill frequently describe it as the double process of dropping off the useless, diffuse movements of its beginning stages, and making a progressive selection of the correct movements. The foregoing paragraph said that there are no correct beginning movements to provide a selection. This is indeed the case. Useless movements are of course dropped. The bicycle rider loosens his grip on the handle bars, and the writer ceases the movements of body, legs, and feet. But correct movements do not come into being through selection. Correct movements are constructs, or developments, which come from the fitting together of a part movement here and a part movement there until finally the product is an integrated, harmonious whole.

The dropping of useless movements results, of course, in a reduction both of total movement and of energy consumed. This does not mean that the final movement is less complex than the partially successful initial movements. The final movement has the controls of many more muscles than have the earlier ones it supersedes.

Imitation and instruction may be valuable aids. The learner generally hits upon the finally successful integrated skill more or less by accident. Usually he cannot foretell a skillful movement before he happens to make it. Then, having acquired it, he cannot describe the way he came to make it. This is not to say that the learner is unconscious of his success and should not be conscious of any gain that he makes. He must be alert to take advantage of any gain in his total performance, however slight. The point is that improvement comes only through trial, and then largely by accident.

Though the learner cannot avoid the accidental feature of his success, he may reduce the accidental failures through attention to the guidance which imitation and instruction give. The teacher and the coach cannot provide an easy road to learning, but each can give valuable aid to the learner. Each by precept and example can provide certain fundamental rules for success which the learner would spend a long time in discovering through his own unguided efforts. In handwriting, the teacher can explain and illustrate such details as the correct posture, the proper position of the paper on the desk, and the proper way to hold the pencil. He can instruct about the total movement in making ovals, about the "push-pull" movement, and the like. In golf, the novice may observe and imitate one or another of the elements of the expert's stance or swing. He may gain much from the expert who shows him how to hold the club, or how to relax in a free swing. The teacher of piano or violin requires his pupil to keep his hands in certain positions. The teacher of typing insists that certain fingers must strike certain keys, and that the learner must use all the fingers instead of only two or three.

What are the appropriate proportions of imitation and instruction for a given learner no one can tell in advance. Some pupils get more help in developing a perceptual pattern by trying to imitate the fundamental positions and movements of the teacher, and others seem to "get the idea" better through verbal instruction. Generally the teacher has to combine demonstration and instruction. He demonstrates more clearly if he points out the phases of movement to imitate. His verbal instruction, in turn, becomes objective through demonstration. Each complements and supplements the other.

Theory helps the teacher rather than the learner. Theory is the general principle of procedure a person formulates out of experiences, his own and the experiences of others. Theory is sometimes helpful to the learner. Occasionally the learner develops a principle that governs what he should try to do and what he should try to avoid. In such cases, the principle of procedure is very helpful. It is the outgrowth of the learner's attempt to employ his memory of past successes and failures as an aid for his present trials. Generally, however, the memory of past experiences that stands out is the memory of failures, which are sources of embarrassment and distraction. Generally, the learner is in a better frame of mind if he concentrates upon what he must try to do *now,* forgetting, if he can, his past experiences.

There is another reason why theory often proves unbeneficial to the learner. It is generally a very inadequate theory, and often incorrect. The learner draws his theory, such as it is, out of an insufficient and mistaken view of his experiences. He is overwhelmed with the difficulty of trying to make the needed movements for the given task or situation. He is poorly prepared to make a proper analysis of his task, the movement he should make, or the tools he must learn to use. His attention is elsewhere. He cannot turn it without prejudice to the difficulties of analysis. Yet every learner does make some sort of analysis. He does see this or that striking phase of the situation or becomes impressed by this or that part of his total performance. In consequence, he may make an entirely incorrect or inadequate theory out of such elements as attract his attention. When such a theory guides subsequent effort, it hinders instead of helps.

The teacher is in position to make an adequate analysis and to develop a helpful theory. He can put himself into the situation of the learner, and he can view the skill both as a whole and in detail. Through analysis the teacher can formulate certain guiding principles of procedure which he may make clear to the learner through verbal instruction and demonstration. Occasionally, the theory may help the learner directly. It may be very helpful indirectly in the degree that it serves to guide the instruction the teacher gives.

Once the teacher has made certain analyses of the skill, he may assist the learner in making a few for himself. These analyses do not, of course, teach movement; yet they may serve as more or less impressive guides of movement. They may help the learner to become in a degree the intelligent director of his own learning activities. Knowing that he should hold his pencil between the thumb and the first two fingers to facilitate the smaller movements in writing, or that he should turn his club in slightly to prevent slicing in golf, or that he should grasp the handle of his hammer at its end, or that he should cut with his saw on the downward stroke, the learner may bring his effort under some small but useful degree of conscious control.

Form can be taught, but execution must be learned. The externals of movement over which the learner can exercise a degree of conscious control constitute form. He can learn form from precept and example. How to sit at a desk, how to hold a racket when serving, when to exercise force in driving a saw, and the like, his teacher can explain and illustrate for him. The execution he himself must learn through his own effortful trials. He cannot learn through copying the efforts of another, and no other can do his work for him. He faces the requirement of doing his own work for himself. This is not to say that the teacher may not give aid. As we have indicated, the pupil may gain his first muscular feel of a movement when his teacher guides him through it. Often the tracing by the teacher of a given letter by moving the pupil's hand and pencil contributes to the pupil's perception both of the letter he should make and of the appropriate movement.

Attention to proper timing helps. In the performance of a skill the various simple movements which compose it must coordinate with respect to time and force. Thus, in riding a bicycle, there is a time to press down hard on the pedal and a time to release the pressure. The swimmer must inhale and exhale in appropriate rhythm with his various strokes, and the strokes must occur in timed sequence. The novice must kick at the proper time to learn the kip in the gymnasium. The coach demonstrates a play with slow movements in order to impress the importance of the sequence and timing of the various component movements. In handwriting and in the teaching of handwriting, the timing is important as a means of providing rhythmic movements. Ordinary observation is sufficient to impress the fact that good writing is rhythmic writing. Careful analytical studies of the elements of good writing show that in the production of a letter form the greatest speed is in the middle of a stroke, and that a close correspondence exists between the speed of a movement and the length of a stroke. In making the letter **f**, for example, the good writer will make the long stroke, numbered 2, in about the same period of time that he consumes in making each of the shorter strokes, numbered 1, 3, and 4.

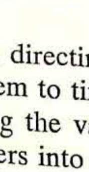


FIG. 10: *Strokes in the letter* **f**

Resort to rhythm in directing the writing practice of beginners is useful in getting them to time their movements properly, and is thus an aid in bringing the various component movements of arm, wrist, hand, and fingers into the coordination that is characteristic of fluent writing. The timing aids in getting each part of the total act to fall into its proper place in relation with the other parts. It also aids in directing the attention of pupils to form, for a knowledge of the form to be produced is necessary before rhythmic writing can be attempted. The pupil's effort to time his movements helps to make him conscious of his need to know the form. In order to give attention to rhythm, he must have the form well enough in mind so that he will have no need to consider in the middle of a stroke just how to go on with the rest of it. The lesson in rhythm is a lesson in perception.

Attention must center on result, rather than on performance. Occasionally, a very effective way to get the learner to correct a faulty movement is to call his attention to it. Sometimes he gets help from the requirement to try to make the movement in the faulty way that needs correction. For example, a typist who persisted in the error of typing "teh" instead of "the" achieved a correction through a few short practice periods in the incorrect procedure of typing "teh." On the other hand, the learner is usually too greatly conscious of his faulty performances, and needs to turn his attention away from them. Giving attention to result, rather than to performance, proves generally to be the most powerful magnet to draw the necessary elementary movements of a skill into a final harmonious whole.

Perhaps the best statement of the matter is that an appropriate balance should exist between attention to performance and attention to result. The golfer must attend to correct form and he must aim for the pin. The writer must maintain correct position and he must have in mind the shapes of the letters he should make. The typist must not forget to use all his fingers and he must have a perception of the order in which his fingers will touch the keys to type a given word. The swimmer must not merely exert himself to keep afloat and to move ahead; he must also attend to the kind of strokes to make.

The appropriate controls of movement must operate throughout. Progress in the development of skill results from the effort of the learner that is under the guidance of appropriate control. This control, as we have seen, is the learner's developing perception of form. Though this control cannot be perfect at the beginning, it is the only control that guarantees ultimate success. Any other type of control leads to the development of a different type of movement from the desired one, though it may seem to provide more progress at the earlier stages. For example, the beginner in typewriting may depend upon vision to locate the keys and use only two or three fingers to press them. He may thereby become able to produce accurate copy in less time than would be possible if he used the touch system and depended upon his imperfect tactual perception of the keyboard. But he would be starting the development of a total typing movement that is not the true one. Again, the beginning pupil in handwriting may depend upon the perfect copy in his writing book and try to "draw" the letters. By this method he will produce a more legible product than would be possible if he should try to "write" the letters under the guidance of his imperfect perception of them. But he would be learning a movement that is not in any sense of the word the handwriting movement. Similarly, at the outset of the development of any skill, the director of the learning activities of the pupil faces the necessity of making a choice of the controls he will require his pupil to depend upon as a guide. On the one hand, there is the control that leads to apparent progress from the outset, but prevents actual success ultimately. On the other, there is the control that seems to retard progress from the outset, but leads finally to the desired successful coordination of movement. The one control is the temporarily more perfect perception of a movement which the pupil should not learn. The other is the temporarily less perfect perception of the movement the pupil should learn.

Summary. The development of a skill is the development of a coordinated movement which the learner cannot practice from the beginning. Practice does not make perfect. Practice does no more than habituate a movement on its present level of inefficiency or efficiency, as the case may be. It is effortful trial that counts, effortful trial that has as a guide the best possible control at the moment and that points toward the best possible product the learner is capable of perceiving at the moment.

The discussion has developed the following main points:

1. The learning of a skill begins with diffusion.
2. The method of learning is the method of trial and partial success.
3. Imitation and instruction may be valuable aids.
4. Theory helps the teacher rather than the learner.
5. Form can be taught, but execution must be learned.
6. Attention to proper timing helps.

7. Attention must center on result, rather than on performance.
8. The appropriate controls of movement must operate throughout.

3. The Development of Movement and Perception in Handwriting

Speed in writing results from practice. Through training the pupil may learn to write a legible hand with reasonable speed—from some thirty letters per minute in the second grade to some eighty letters per minute in the eighth grade. Legibility and speed are not sudden attainments, but gradual developments. The development of speed of movement is especially obvious in every skill, including the skill of handwriting. First movements are halting and slow and later movements are rapid. Gains in speed are more rapid in the earlier stages of practice. Through practice the first halting movements change to later rapid coordinations.

The way the pupil uses his effort explains his development in speed through practice. At first he makes the movements to produce a letter, or a word, or a sentence, more or less in seriatim. That is to say, he moves his fingers until he has come to the limit of his reach. Then, by moving his hand, he makes adjustments for succeeding movements of his fingers. Finally, he moves hand, wrist, and forearm in order to carry forward his writing to the end of the line. Through practice he slowly brings these initially unrelated and successive movements together into a coordination, though not always the correct coordination. As he develops coordination he tends to make the initial successive movements more and more simultaneously. In this manner he comes to make a given series of movements in a half or a third the time required at first. Later, he improves his coordination, making it with greater ease, and reduces still further thereby the total time required.

Legibility develops with an improvement of perception. Practice also gets the feel of the movement into the muscles, and thus contributes to the muscular perception. Improvement in the muscular perception in handwriting is a product of practice. Initial halting movements produce a style of writing that looks halting, broken, and unsteady. Later, as the movements build into a coordination, marked changes appear in the writing product. Free flowing lines substitute for broken, wavy lines. Initial disconnected strokes change into related ones, and a smoothness appears in the lines that was not in evidence in the beginning. Practice produces fluency, and fluency is a characteristic of legible writing.

Though legible writing is always fluent, fluent writing is not always highly legible. Besides fluency, legible writing requires other characteristics—alignment, slant, spacing, and, most important of all, letter-formation. Practice alone, which leads to muscular perception alone, may remain on its initial low level as regards the characteristics just mentioned. Through practice a better quality of line may result, but the letters may remain as poorly formed as they were at the outset. As a consequence, the improvement in legibility is only slight. Visual perception as well as muscular perception must improve for the quality of the product to improve.

We may consider a single illustration. Other things being equal, a smoothly made **a** is more legible than a broken, haltingly made **a**. Yet if the **a** does not properly close, or if the tail takes the wrong direction, the letter has the appearance of a **u** or an **o**. Improvement requires a better visual perception of the letter. The pupil must give attention to the way the letter should close at the top and to the characteristic way the tail should curve. When the effects of such attention combine with a developing fluency, legibility markedly improves.

Legibility and speed appear to be antagonistic products. The appearance of antagonism between legibility and speed of writing is inherent in personal experience. Whenever we try to write with greater legibility than usual, we necessarily write with slower speed; whenever we rush to get our writing done, the quality of the product suffers. An increase in the one results in a decrease in the other.

The apparent antagonism between legibility and speed is evident also when we study the experiences of pupils in school. Because emphasis upon either tends to make it improve at the expense of the other, we find that most pupils develop a double standard. They employ one standard as the gauge and control of their writing efforts in the handwriting class and another for the rest of their writing efforts. The double standard does not result from the inclinations of the pupils, but from the requirements the school imposes. In the handwriting class, the pupil must try to write as legibly as he can. Here he writes legibly at a slow rate of speed. In his other schoolwork, he must speed up his writing. He must take his notes and write his exercises at a higher rate of speed. In consequence, the quality of his writing suffers. Thus, the pupil develops two styles of writing, the one with good quality and slow speed and the other with high speed and poor quality.

The remedy for the double standard quickly suggests itself. Let the emphasis on legibility in the handwriting class be reduced, and let the necessity for rapid writing in the pupil's other work be removed. This remedy may guarantee against the development of a double standard, but it would probably produce the single standard of poor quality and slow speed. The standard of poor quality would not meet the need of improving legibility in the writing class, and the standard of slow speed would not meet the need of writing rapidly in other classes. A low single standard is not an appropriate substitute for the double standard.

Legibility and speed may develop together. The attempt either to increase speed or to improve quality of writing beyond the points that are usual and habitual results in an excess of attention to the one characteristic at the expense of the other. The theory of antagonism between speed and quality is not the explanation. Excess of attention to either characteristic means that the writer deliberately neglects the other. The neglected characteristic suffers because of neglect, and not because of a negative relationship with the other. Observations of the progress of pupils in well-conducted classes in handwriting suggest that there is a middle ground of reasonable speed and satisfactory quality lying somewhere between undue speed and unnecessary quality, and that pupils may develop reasonable proficiency in both characteristics.

Perception and movement may improve together. Legible writing possesses certain outstanding characteristics. It has uniform slant, uniform alignment, good quality of line, and proper spacing. A fifth, and perhaps the most important, characteristic of good writing is good letter-formation. If the letters are correctly formed, they are legible; if they are poorly formed, they are relatively illegible. When the pupil pays attention to these characteristics as they appear in good writing, and contrasts his own writing item by item with them, he improves his visual perception, and thus produces a better control of his effort.

Coordination of movement results from practice. Improving the practice avoids the poor, or improper, coordination that mere practice may produce. Improved practice comes through a gradual development of the control of movement—namely, perception.

Improvement of perception and improvement of movement are interdependent. Improved perception leads to a better quality of writing. Practice in the production of the better quality leads to freer, more rapid movement. In turn, the more rapid movement contributes to the quality because it is freer, more fluent, and more rhythmic.

Speed and quality of writing ought to develop together. In the beginning the writing movement is naturally awkward and imperfect. At first the school should be satisfied with imperfections, but ought always to keep before the pupil the possibility of improvement. The pupil's best possible perception of form should guide his practice. He should practice until he can make the movement with greater ease. Meanwhile, the pupil should study form to gain a better perception of form. His perception of form should now guide his practice. The slightly improved practice that results may be slower. The improved practice should continue until it becomes freer and more rapid. Thus, attention to better and better perception of form, and more and more improved practice, should continue until a product results that is reasonably legible and reasonably rapid. The law of diminishing returns should determine when practice should cease.

Learning to write is the gradual adaptation of the handwriting movement to a gradually developing perception of form. Movement develops through practice. Practice leads to coordination of muscles, and consequently to an easier, more rhythmic, more fluent movement. Attention to form leads to better perception of form, which, in turn, is a better guide to the movement and a means of improving the practice. The improved practice results in better legibility of the writing. Speed increases as the handwriting movement develops and becomes automatic. Quality improves as the perception of form develops.

We may show in diagram (Figure 11) the parallel improvement of perception and movement, and of legibility and speed. Imagine the pupil's levels of legibility and speed at the points, 1, 1′. The first step looking to improvement is to increase the legibility slightly through attention to better form. This changes the levels to 2, 2′. Next, the practice of movement increases the speed at the legibility level of 2. As a result, the levels of legibility and speed raise to 3, 3′. And so on, the improvement of perception and the improvement of movement continue from levels 3, 3′.

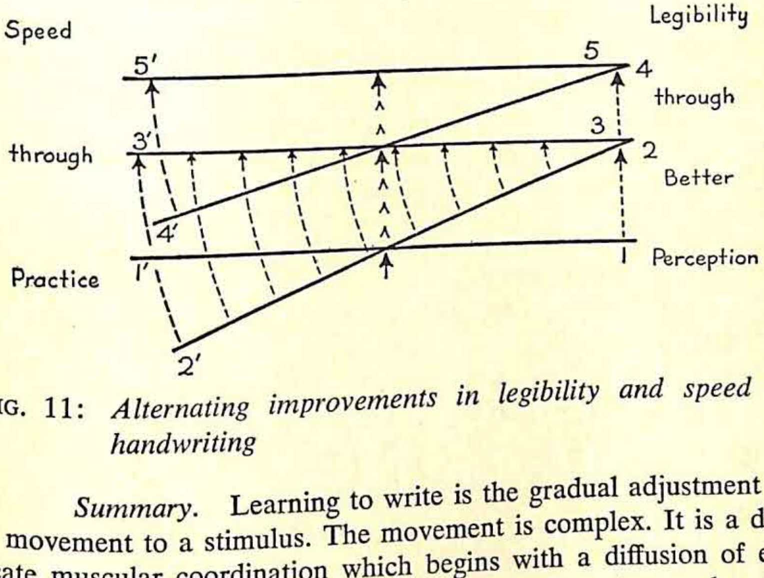


FIG. 11: *Alternating improvements in legibility and speed of handwriting*

Summary. Learning to write is the gradual adjustment of a movement to a stimulus. The movement is complex. It is a delicate muscular coordination which begins with a diffusion of energy and impulse and gradually develops into a free and automatic movement. The stimulus is the letter form or forms—not the one or ones in the copy, but the form or forms in the mind's eye. In the beginning the movement is imperfect, and the pupil's perception of form is imperfect. Practice of movement, without a concurrent and resulting development of perception, leads to automatic writing that is poor in quality. Conversely, the study of form is no substitute for practice. There must result from both practice of movement and study of form a progressive control of movement and a better perception of form.

Each influences the other. Practice in making the letter according to the pattern in the pupil's mind will lead to a more complete and correct perception. The resulting better perception makes possible the development through practice of a freer and a better movement. Learning to write is the gradual adjustment of a movement to a gradually developing stimulus.

The following points were developed in the discussion:

1. Speed in writing results from practice.
2. Legibility develops with an improvement of perception.
3. Legibility and speed appear to be antagonistic products.
4. Legibility and speed may develop together.
5. Perception and movement may improve together.

Chapter 12

Building Perceptions

Purpose of the chapter. An early chapter outlines the general character of the perceptual process. The chapter immediately preceding indicates the importance of perception as a guide of movement in the development of skill. The present chapter enlarges these discussion and gives them a practical bearing. It points out how the pupil may build up important patterns of perception in his pursuit of some of the major subjects of the school. The discussions of the present chapter develop three main topics: (1) perceptions of space, (2) perceptions of words, and (3) recognitions of number relations.

1. Perceptions of Space

Space is not an object of sensation. The ability of the ordinary individual to distinguish the common objects of a familiar class is of a very low order. He has been seeing trees all his life, but aside from a half dozen or so that are familiar, all trees look very much alike to him. He is unable to recall and picture the seemingly familiar space between two familiar places. He experiences the greatest difficulty when he tries to recall in order the series of hills over which the road extends to a nearby town. He has traveled the road scores of times, and seems perfectly familiar with each change in the grade and direction of the road as he approaches it in driving, even at night. Yet his attempt to picture in his mind these successive changes is very confusing. The distance between his home and his office seems shorter when he drives than when he walks. The teacher of handwriting notices the slow progress of the beginning pupil in distinguishing the successive details and the total form of simple letters like *a* and *o, b* and *d,* and so on. The teacher of geometry confronts the difficulty of getting students to understand the figures they must study.

The perception of space is a complex process. When we pay attention to details, our perception of total form fades. When we turn our attention to a synthesis of details, our perception of details seems to vanish. Our perception of one detail appears to fade as we develop the perception of another. Only through careful analytical scrutiny of details and orderly synthesis into patterns of wholes do we build perceptions of things that are at all complete and accurate. When we consider our difficulties in dealing with any configuration that is not familiar, we may appreciate the confusion and difficulty of the elementary pupil as he tries to master the forms of the simple letters, and of the high school student as he tries to absorb the characteristics of surfaces and solids.

Ordinary perceptives are usually inaccurate. The shifting of attention during the study of a pattern or figure indicates why ordinary perceptions are usually inaccurate and incomplete. The shifting results in improvement at one point and a lapse at another, and sometimes alternations of improvements and lapses in the total perception. In the continuous systematic study of a pattern the improvements come finally to overbalance the lapses. Yet this result is not usually the case as regards ordinary experience. In ordinary experience, there is little continuous systematic study of a pattern. The motorist, for example, does not study the road he travels to the nearby town in systematic detail or orderly pattern. He drives the road as it comes into view with its numerous details of grades and curves. Yet he thinks of them only in passing and has no occasion to organize them into a continuous pattern.

The perceptions a person develops are the products of his practical adjustments. There is no need on the driver's part, for example, to unite into a complete perception his impressions of the changing grades and directions of the road. His chief concern is to be alert to each detail of the road as he comes to it. In consequence, the perception he develops of the whole road is largely accidental. So it is with respect to the perception of the primary pupil of the letter *a* that he must learn to write, or with respect to the perception of the beginning student in geometry of the figures he must study. Earlier contacts, whether with letters or with figures, have been infrequent and accidental, and have not required the development of accurate perceptions.

An interesting illustration of the relation between the development of perceptions and practical adjustments is the relation between the ability to draw and the ability to understand science. On the one hand, we may note in students little relationship between ability in representative drawing and progress in science. That is to say, students who are good in the mere picturing of the specimens they must study may be either good or poor in science. Other students may improve in science without improving their drawing. On the other hand, we may observe a close relationship between analytical drawing and science. Students who must make an analytical study of the details of structure and function in preparation for a diagrammatic sketch improve in their scientific understanding. The study of structure and function also prepares the student for the production of an analytical sketch. In short, the student's perception of a laboratory specimen seems to develop according to the practical purpose he has for developing it.

Perception of space is a consciousness of relations. A person must do more to perceive space than travel through it and pile up sensory experience of it. We do not see space. When it seems that we see a definite division of space, such as a circle or the inside of a box, we see only the boundaries which confine it or the objects within that particularize it. We do not conceive of "empty space" of itself alone. We do not picture empty space as a single image which we fill with the objects of the universe we can sense. Our concept of empty space is an imagined vast emptiness that needs certain confines or limits to give it character. We use the expression "limitless space" for a feeling rather than a perception.

We perceive space in terms of its dimensions, of the limits that confine it, and of the objects that fill it. We actually do not perceive space directly, but rather its boundaries and the objects it may contain. We perceive the confines around and the objects within directly, and the space indirectly. In other words, our perception of a given division of space is a combination of the various perceptions of confines and objects that we bring together into a relationship.

The matter under discussion has a practical bearing in respect to the perceptions of space that result from the study of maps in geography. The pupil of the geography class commonly exhibits the utmost confusion about the relative sizes of the various political divisions he has been studying. He gives the answers: "Texas is twice as large as West Virginia." "Australia is perhaps as large as the United States east of the Mississippi." "Brazil is about the size of New York and Pennsylvania." His perceptions of the relatively unfamiliar regions are inadequate. One reason is that he lacks the perceptions of objects—cities, mountains, lakes, and rivers—to fill them. For his home state, or for a relatively familiar region, the pupil has perceptions of such objects. In consequence, his consciousness of the relationship of the few objects in a relatively unfamiliar region is quite different from his consciousness of the relationship of the many in a familiar region.

What we have said about the pupil's perceptions of objects in a given region, or about the lack of them, does not apply to the actual presence of the objects. To be perceived, objects within a given division of space have to be present. But their presence does not guarantee adequate perceptions of them. There may be no more objects within a familiar region than within an unfamiliar one. The important fact is that a person perceives more. He unites more objects into a complexity which is a more adequate total perception. The whole matter as regards the perception of the space a map represents may be concluded in the statement that no one reads a map merely by looking at it. He perceives it only in the degree that he organizes the objects the map indicates—cities, mountains, lakes, and rivers—into an understandable relationship each to every other. Map study is a matter of careful analytical scrutiny and orderly synthesis of details.

Space is an excellent medium for the expression of relations. The fact that the perception of space is a consciousness of relations becomes impressive when we recall that space is a kind of universal pattern for the expression of many forms of relational experiences. We speak of *high* costs, *low* production, and economic *depression*. We indicate qualities, amounts, and conditions by the *levels* on which we place them. We describe our feelings as *elevated* or *depressed*. We observe the student with *low* grades working to *raise* them. Our perceptions of space serve constantly as a ready-made pattern for the shaping of our unspatial experiences into understandable relations.

Not only do our crude everyday experiences take shape in our thinking in terms of spatial percepts; the most exact sciences are in large degree interpretations that grow out of spatial representations of their data. The physicist represents by the varying dimensions of a graph a long series of observations of the varying relations of volumes, temperatures, and pressures. The mathematician makes clear a general law of the combination of numbers when he plots the curve of the algebraic equation that expresses it. Graphs and curves represent all sorts of exact relationships. Fluctuations in commodity prices, the various purposes for which the tax dollar is spent, the growth in the school population, and the comparison of the student's present grades with former ones—all become clear and impressive through graphic representation. Consciousness of relationship provides our perception of space. The same kind of consciousness makes vivid all other kinds of relationships when they appear in spatial representation.

There is a growing realization by the teachers and the schools that pupils in the early grades can understand the use of space to express related facts. The newer textbooks show many graphs and diagrams to supplement the discussions and to make them vivid. Many schools provide well-planned sequences of lessons in the making and reading of graphs. One explanation for the use of graphs is that the pupil will give more effective attention to a series of facts if they make an appeal through the eye. Another explanation is that basically the perceptions of space of all human beings are much the same. This explanation has good foundation in fact. Human beings walk uprightly on a flat earth and, in consequence, are peculiarly sensitive to the vertical and to the horizontal. They can detect any slight variation from the vertical or from the horizontal, whereas the variations within the angles of thirty or sixty degrees drawn from either have to be larger in order to be detected. "Up" and "down," and "forward" and "backward," are contrasting ideas that are universally understood.

Scientific study of space differs from ordinary observation of space. However much the same may be the basic perceptions of space of all people, the fact remains that the perceptions that result from a scientific study of space transcend in importance those that are the products of ordinary observation. In the first place, scientific study, because it is systematic and painstaking, brings into the field of attention many more of the details of a given division of space than does ordinary observation; and it seeks out for special attention the less obvious details that ordinary observation generally does not touch. For example, ordinary observation does not uncover the fact that the three angles of a triangle are equal in size to two right angles, or that a circle can become in imagination a rectangle one-half the circumference in length and the radius in width. Secondly, scientific study brings together into a more exact relationship, into a more complete perception, the various details that have been the objects of attention. For example, the systematic study of a map results in a better understanding by far of a given region than is possible through casual, incidental examination of the map. A further illustration is provided by the pupil who has had careful training in the reading of graphs. In his later studies in the natural and the social sciences, this pupil is a ready and certain interpreter of the graphic representations of data his textbooks present for his consideration. The pupil who has missed the preparatory training is frequently distracted from the data he should study by the complexity of the graphs that would otherwise portray them.

The logical analysis of divisions of space requires preparation. A later discussion suggests that the study of geometry is the study of proof. It points out that the study of geometry requires the student to make logical analyses of various configurations of space and to make logical syntheses of selected details. We are concerned here with one of the types of difficulty students experience in these activities.

The student of geometry has no easy subject. Lack of preparation adds to his difficulty. The activities of analysis and synthesis require close attention. The student always must face the difficulty of dealing with the figure at hand. Frequently, he does not understand the figure with which he must deal.

The student who comes to the geometry class with clear and adequate perceptions of the figures he must study has a decided advantage over the student who lacks preparation. Preparation does not remove the inherent difficulties, but it reduces them. Often much of the difficulty of a demonstration disappears when the student becomes clear about the configuration with which the demonstration deals.

Many schools seek to remove the initial difficulties of students of geometry by providing preparatory courses in intuitive and constructive geometry. These courses build up perceptions of the common divisions of space in advance of the high-school course in demonstrative geometry. Many other schools have continued to neglect their opportunities and obligations to provide preparatory training for the study of geometry.

Summary. Although the perceptions of space of all human beings are basically the same, and despite the fact that space is the most readily accessible and understandable medium for the expression of relational experiences, space is not seen merely by opening the eyes and looking. The perception of space is a complex experience, a consciousness of relations that requires more than ordinary observation for its acquisition. The discussions which have just been concluded have developed under the following points:

1. Space is not an object of sensation.
2. Ordinary perceptions are usually inaccurate.
3. Perception of space is a consciousness of relations.
4. Space is an excellent medium for the expression of relations.
5. Scientific study of space differs from ordinary observation of space.
6. The logical analysis of divisions of space requires preparation.

2. Perceptions of Words

Records of eye movements suggest the way we recognize words when we read. As the eyes of the reader move across the line of print from left to right, they move in a series of quick, short movements and fixation pauses of short duration. We may note the movements and pauses by holding before the reader a page in which we have pricked a pin hole. We can estimate closely

Table 1. Number and duration of fixation pauses and number of regressive movements per line of print by various readers reading different kinds of material, reading in different ways, and reading for different purposes.

Recording Reader	*Kind of Material*	*Kind of Reading*	*Purpose of Reading*	*Fixations per Line*	*Average Duration in 25ths of Second*	*Regressive Movements per Line*
1. Pupil in grade 1A	story	silent	to get story	16	11	6
2. Student in high school	"	"	"	4	7	0
3. Pupil in 1A	"	"	"	8	7	1
4. Mature Reader A	"	oral	"	7	14	1
5. " " A	"	silent	"	4	14	0
6. " " B	"	oral	"	10	17	0
7. " " B	"	silent	"	8	10	0
8. " " C	algebra text	"	to prepare lesson	20	6	9
9. " " D	story	"	to get story	8	6	0
10. " " D	"	"	to answer questions	17	6	4
11. " " E	"	"	to get story	10	5	1
12. " " E	"	"	to answer questions	17	5	6
13. " " F	Latin passage	"	to get meaning	26	7	8
14. " " G	"	"	"	10	7	2

the number of pauses the reader makes in a line. We can see the long sweep of the eyes from the end of one line to the beginning of the next, and we may sometimes note backward or regressive movements that intrude among the straightforward movements. We cannot tell the duration of the reading pauses, but we can get the indication that the speed of the reading is in inverse ratio to the number of the pauses.

The eyes do not see during movement. They see only when they momentarily pause or fixate. They see distinctly at a pause only a small area that includes no more than three or four letters of print when the page is at the normal distance from the eyes.

By means of the motion picture camera in the educational laboratory, investigators have obtained accurate recordings of the eye movements and pauses of readers of various ages and of various amounts of training while they were reading various kinds of content for various purposes. These recordings show the points in the line of print where the eyes pause or fixate; the number, duration, and order of the pauses in each line; and the number of regressive movements in the line. Each record shows at a glance whether the reading was straightforward and rapid or hesitating and slow. Each indicates whether the reading was good or poor, mature or relatively ineffective. Straightforward and rapid reading indicates ease, fluency, and efficiency. Hesitating and slow reading indicates difficulty, confusion, and inefficiency.

Table 1 summarizes the findings of fourteen recordings involving ten different readers. For convenient reference, each recording has its number. We may read the table: A pupil in Grade 1A, reading a story silently "to get the story," made in the reading of a line sixteen fixations, averaging eleven twenty-fifths of a second, and six regressive movements. A student in high school, reading a story silently "to get the story," made in the reading of a line four fixations, averaging seven twenty-fifths of a second, and no regressive movements. The table contrasts immature and mature reading, oral and silent reading, fluent and analytical reading, and ordinary reading and reading to answer questions.

Recordings 1 and 2 indicate two highly contrasting methods of perceiving words in reading. The immature reader carefully scrutinizes the detailed appearances of his words. The mature reader sees few details. In the one case, perception requires somewhat complete details; in the other, it proceeds from very slight sensory cues.

Reading was once considered word-building. The careful analytical examination the immature reader makes of the details of the words he reads seems to bear out the timeworn belief that perception in reading proceeds letter by letter. This earlier belief was to the effect that the perceptions of the letters build the perception of the whole word. On the basis of the belief, the A-B-C method of teaching reading has held sway in our schools from the days of the Greeks and Romans down to the present century.

The word-building conception of reading grew out of the early relation of writing and reading. Before the invention of the alphabet, writing was the art of devising a picture sign for the idea, and reading was the process of writing in reverse—that is, the process of deciphering the idea from the picture sign. Later, following the invention of the alphabet, writing and reading continued to appear as reversible processes. The essence of writing was the act of breaking down the sound of a word into its constituent letter sounds. Reading, then, was the opposite process of rebuilding the word out of its constituent letters.

There may have been a good deal of truth in the word-building conception of reading. In former days, reading certainly was not the smooth, straightforward, easy, and rapid process that it is today for the mature reader such as recording 2 discloses. In former times, reading was a slow, time-consuming process. In considerable measure, reading was the process of spelling out the words from the letters. Like the immature reader, such as recording 1 discloses, readers of former days no doubt had to scrutinize with care every detail of every word they read.

We perceive words as wholes. Whether the reader needs to look at a word once or several times, he perceives it as he perceives any other object of central interest—as a whole. To examine the spelling, he must attend to the sequence of letters. To read the word as a representation of meaning, he must attend to the word as a complete unity, since the word is the smallest division of language that gives meaning. While he is learning to read, he may need to attend to the details of each word in order to distinguish it from others of closely similar appearance. He must look at the word *cat* more than once in order to distinguish it from *cap* and *can*.

What he must do to recognize any word depends upon the completeness of the perceptual pattern he has built.

A person who is well acquainted with trees possesses fairly complete perceptual patterns of the various kinds of trees. What he sees at the merest glance at a pine tree, for example, fits readily into his perceptual pattern of the pine tree. Another person may possess very incomplete and inadequate patterns of trees. He must provide himself with many sensory details of the pine tree in order to fit it into his perceptual pattern of that tree. At times, he makes the mistake of fitting his sensory experiences of the pine into his pattern of the cedar. Immature readers frequently make similar blunders in their perceptions of words.

The beginning pupil possesses faulty perceptual patterns. The reason why the immature reader has to take so many peeps (fixations), at each word, as recording 1 indicates, is that he has for each an incomplete or inadequate perceptual pattern. He must fill the gaps in his perceptual pattern with an abundance of sensory detail which he gets from looking at the parts of the word. He must see all the word in order to perceive it.

The immature reader has moved beyond the very beginning stages of the perceptual process in reading. He can read, though inexpertly. He seems able to recognize at a glance some of the words to which he has been introduced. He is able to recognize these words with ease because his primary lesson contains only a few words, and not because he possesses adequate perceptual patterns. He recognizes these words because he has learned to fix attention upon their dominating characteristics. For example, *pig* has the characteristic *i* in its middle and the tail of its *g; box* has the circular *o* and the crossed lines of the *x;* and *elephant* and *telephone* are of unusual size. Sometimes, the pupil can recognize a whole phrase at a glance by the accidental thumbprint on the phrase card or by the position the teacher gives it on the blackboard ledge. Such misplaced attention is sufficient at the very beginning, when the pupil has learned and uses in his reading only a few words. But later, when he must deal with more words, he mistakenly recognizes *tip* as *pig, log* as *pig, cap* as *cat, kind* as *king, saw* as *was, hen* as *man, mat* as *mad,* and so on. The faulty perceptual patterns of the beginning pupil seem good enough for the few words of his early primer lessons. They turn out to be inadequate when he is required to give attention to an increasing number of words with common details.

The beginner must observe details. The words the beginning pupil must learn have common similarities and distinctive differences. Each word has details of make-up that other words possess. Each in some prominent detail looks the same as one or several others. Each has its distinguishing feature (or features) that sets it apart. Similarities are confusing in their abundance. Differences are often relatively obscure.

The word *pig* has its similar counterparts in *big, dig, wig; cat,* in *cap, can, car;* and so on. The pupil has little trouble in noticing similarities. To distinguish a word, he has to note the feature that makes it different. Until a word becomes a familiar and a characteristic total form, the reader must view its details to distinguish it from other words of somewhat like appearance. As we have said, the immature reader must take two or three peeps (fixations) at the word *cat* to distinguish it from *cap* and *can*. This does not mean that he necessarily thinks *cap* and *can* as he perceives *cat*. He merely looks over *cat,* sighting all details of *cat* to note its distinctive feature. His teacher points out the distinctive feature and he becomes conscious of it. In his reading he must retain enough consciousness of the characteristic detail to recognize the whole word by means of its special influence. Yet he attends as he learns *cat* to all its details. He views the single word much as a mature reader views a single definite point searched out by scanning an article in a reference book. He sees, and passes over and neglects, all other points in order to look more closely at the point of his search. He views the single word much as he views all the figures later on when he adds a column. He sees and notes the zeros in the column only to neglect them for the figures that he must deal with in adding. The immature reader perceives his words as words, but he perceives them with enough analysis of details to note the detail in each which makes perception possible.

Practice removes the need for analysis. Practice in recognizing a word through its distinguishing feature makes this detail more distinctive. It becomes distinctive enough for the reader to sense at a glance (single fixation). It finally may become so distinctive as to make perception possible when the reader senses it along with the distinctive features of one or two other words, all at a glance (single fixation). Now he not merely recognizes some words as words but also some as they together constitute a phrase whole. As an expert he may read in phrase wholes. The mature reader does not need to make a close inspection of the printed words as he reads them. Having built patterns of perception, he needs as he reads no perceptions of details, except in the case of new words, for further construction. The mature reader needs only slight sensory experiences with the printed words before him to produce adequate and usable perceptions. His earlier practice of the process of perception, which at the outset requires close scrutinizing of details, has resulted not merely in immediate perceptions, but also in the growth of perceptual patterns. As practice proceeds, the patterns grow. Finally, when they have grown to adequacy, they no longer require the perceptions of details for further growth.

Meaning aids perception. The printed word represents to the reader either its spoken counterpart, or its proper meaning, or both. Sometimes printed words merely suggest words to pronounce, not ideas to consider. When the pupil gives overbalanced attention to the form of the printed word and to the sounds of its phonetic elements, he overlooks the meaning the word may convey. This result is a defeat of the purpose of training. The purpose of training in the analytical examination of words is not to emphasize the importance of the analyzed elements, but to lead the pupil to the point where he is a perceptual master of the elements. The intent of the practice exercises in recognizing words is to make perception ready enough for the pupil to give the major part of his attention to the meaning the words may transmit. Attention to meaning is important in its own right. It is important also as a means of facilitating the recognition the reader must achieve. Attention to meanings materially aids the recognition of the printed word. This is highly important. The cue of the context tips the balance in favor of the ready recognition of the word.

As the improved reader needs to give less and less attention to details, he can give more and more attention to meanings. Finally, when he has gained word mastery so that he can recognize each word at a glance, he can devote practically his entire attention to the meanings which the words are intended to suggest. This kind of attention may lead, as we have mentioned, to reading in meaningful phrase wholes instead of in mere word wholes.

Perception adjusts to purpose. The purpose of the perception determines in part the conditions of its performance. Perception in reading is not the same as perception in spelling. Perception in reading requires only enough of the detail of a word to distinguish it. Perception when a person views a word to determine its spelling requires attention to all the letters and to their sequential arrangement. The good reader is frequently a poor speller, and the good speller may be a poor reader.

The varying demands of silent and oral reading modify the conditions governing perception. In silent reading, the requirement is rapid recognition. The unit that governs is the unit of recognition, which may be the word or the phrase. In oral reading, the requirement is pronunciation. The unit that governs is the word, which is the unit of pronunciation. In silent reading, perception proceeds as rapidly as the reader can gain the sensory experiences necessary for recognition, whether of words or phrases. In oral reading, perception can proceed no more rapidly than the voice can pronounce. In oral reading, the eye must constantly wait on a word until the voice has caught up. Recordings 4, 5, 6, and 7, in Table 1, show the contrast between the numbers of fixations in silent reading and oral reading. With the good reader—reader A—the fixations in silent reading are fewer. With the poor reader—reader B—the numbers of fixations in the two kinds of reading are closely the same.

Other conditions—the difficulty of the reading material (relative unfamiliarity of the words), the nature of the content, the attitude of the reader, etc.—serve to modify the perceptual process. Recordings 8 to 14, in Table 1, show the effects of these conditions. Analytical reading of textbook materials—recordings 8, 10, 12, 13, and 14—is not the same as the fluent reading required to follow the movement of a story, description, or discussion.

Summary. Whether the reader perceives with ease or with difficulty depends upon the completeness of the perceptual patterns he has built up. These patterns build from the sensing of the details of printed words through analytical examination. The discussions just concluded have been in support of the following points:

1. Records of eye movements suggest the way we recognize words when we read.
2. Reading was once considered word-building.

3. We perceive words as wholes.
4. The beginning pupil possesses faulty perceptual patterns.
5. The beginner must observe details.
6. Practice removes the need for analysis.
7. Meaning aids perception.
8. Perception adjusts to purpose.

3. Recognitions of Number Relations

Primitive number ideas were based upon perceptions. The idea of number is the idea of the group. Number ideas develop from the study of groups. They are inexact and indefinite or exact and clear, depending upon the methods the individual uses in his study. Civilized man is in possession of systematic methods of studying groups that primitive peoples did not possess. A later chapter indicates certain methods that are systematic. We may here recall the kind of unsystematic methods early peoples had to employ.

The methods the primitive man used to pay attention to groups were the methods of direct perception. He interpreted a group roughly as its size appeared, as "few," or "many," or "many, many." He named the objects he possessed. The early shepherd probably did not know that he owned four sheep. He did know that Whitey and Blackie and Brownie and Wagtail were his sheep. The names helped to fix sufficient attention upon each as an individual to determine whether it was present or missing. The primitive man used tallies to help him keep track of his possessions. For tallies he cut notches in sticks (*talea,* "cutting") and laid aside pebbles or *calculi* (*calculus,* "stone"). The Apache Indians of Arizona keep account of their ponies by carrying a sack of pebbles which correspond in number to their ponies. If an Indian loses his sack of pebbles, he becomes confused. As a further means of guiding his attention to groups of various sizes, early man made direct comparisons with certain familiar groups, such as "ears," "clover leaves," and "fingers." He used analogies like the following: "I saw as many deer as the fingers on my hand." "I killed as many as a man has ears." "As many escaped as a clover has leaves."

Ideas of arrangement derive from perceptions. Perceptions provided the basis of the number ideas of primitive peoples. Perceptions also set the limits for the growth of their number ideas. When we glimpse a number of objects in disarray, we can apprehend their number only up to four, five, or six. When more than five or six objects are in the group, we must look at the group more than once. With all our training in number we can apprehend groups only up to five or six through single acts of direct perception. To apprehend larger groups, we make use of more than single perceptions. Thus, when we note five here, and five there, and four yonder, we apprehend fourteen at once. Our perceptions give the basis for our apprehension of fourteen, but do not explain it. The explanation is that through training we have learned certain systematic methods of combining our simple perceptions, methods which primitive peoples did not possess and which do not grow out of direct perceptual experiences. It was not until primitive peoples had learned to give attention not merely to perceptions but also to methods of combination that they were able to develop more than the very vaguest ideas of groups larger than two, or three, or four.

Similarly, the pupil in school must learn to extend his thinking beyond his perceptual experiences to develop number ideas. The pupil must also return frequently to perceptual experiences to check his developing number ideas. Thus, to answer the question, "How many are two and three?" the pupil may need to count out two objects, then three, and then count the two groups together. Supposing that the pupil already has had experience in adding "one more," his teacher by clear questioning may get him to "think" the adding of three and three and perhaps three and four. Yet at the time the pupil must deal directly with the actual grouping of three and three and of three and four in order to make sure that he has done his thinking correctly.

Similarly, when the pupil first adds eight and seven, he must rely upon direct perception both to guide and to check his thinking. At the outset he may consider his question to be, "Eight and seven are *ten* and how many?" To answer, he counts in the first group, "Eight," and in the second, "Nine, *ten*." He now counts the number left in the second group: "Eight and two are ten." "Two from seven is five." "Eight and seven are ten and five." Now he can think and say, "Eight and seven are fifteen." His direct perceptions give content for his method of thinking answers. At the outset he must frequently return to direct perceptions to check his thinking.

Throughout the pupil's early work in arithmetic he demonstrates to himself many similar arrangements to provide foundation for his ideas of arrangement. Yet he must move as quickly as possible from the direct experiences so that his thinking may not be tied down by them. They are not the superstructure of his ideas, but the foundation. They make possible, though they do not guarantee, the valuable superstructure which the pupil can build upon them.

Familiar situations give practice in the perception of ideas of arrangement. If an idea of arrangement—like adding or dividing or finding the per cent—is to become of value in the subsequent thinking of the pupil, it needs more than a mere introduction. The idea must become so familiar as to be at hand for ready use. Such familiarity the pupil gains through practice in recognizing the idea.

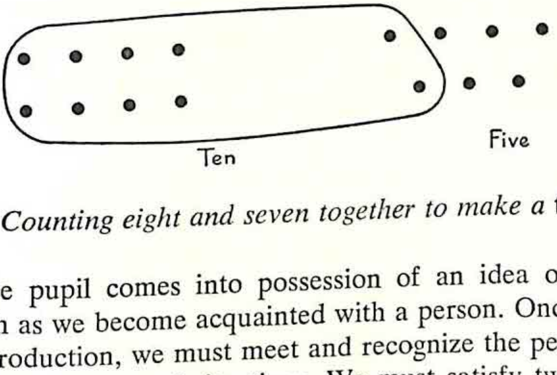


FIG. 12: *Counting eight and seven together to make a* teen

The pupil comes into possession of an idea of arrangement much as we become acquainted with a person. Once we have had an introduction, we must meet and recognize the person again and again in a variety of situations. We must satisfy two requirements: (1) We must recognize the person, not merely meet him. If we see the person in a crowd—in a situation that is unusual, or distracting, or interesting—and do not recognize him, we do not add to our acquaintance. (2) We must recognize the person in various situations. Recognizing the person amid the amenities of a social gathering helps. But we must also meet and recognize him, noting how he conducts himself, at work, at play, on the street, in the office or shop, in business transactions, as a citizen, and so on. Only through a variety of recognitions can we gain the facts of the person's character.

In the same way that we must recognize a person in various situations, the pupil must meet and recognize an idea of arrangement again and again in a variety of situations. When the pupil has worked and thought answers to questions about subtracting and has thereby an idea of his own about subtracting, he meets situations in which the idea of subtracting appears as an element. First his teacher and later his textbook provide the situations. We call these situations problems. Yet they are not problems in the true sense, but described situations that give further illustration of the idea to which the pupil has been introduced.

The situations are both real and imaginary: "Henry had five marbles, but lost two on the way to school. How many marbles has he left?" "Henry caught five fish and gave George two. How many did Henry have left?" The situations must be familiar enough for the pupil to recognize in them the idea of subtracting. "Working the problem" is a minor requirement. Recognizing the idea of arrangement is the activity of major importance. Other elements of the total situation, such as the intriguing experiences of Henry's fishing trip, must not be too prominent. If they are, they may distract the pupil from the essential idea which he must recognize if his attention to the situation is to be at all profitable.

The idea of subtracting must appear in various guises and in various circumstances. The purpose is to give the pupil views of the idea from various angles. Practice in recognizing the idea in a variety of situations is the means of gaining a working acquaintance with it.

Early perceptions often come from insufficient cues. Frequently the teacher or the text gives problem situations containing an idea—addition in the first grade or percentage in the sixth—to which the pupil has had no real introduction. These problems give the pupil insufficient or misleading cues for recognizing the idea. A case in point is the pupil who recognizes addition in the form or phrasing of the questions: "*How many* were there altogether?" "*How much* did the pencils cost?" Because the phrases "how many" and "how much" give him the cue, the pupil seems to get practice in recognizing the idea of addition. Yet his recognitions are merely of something to do. When he comes to multiplication, he meets in his practice exercises the questions "how many" and "how much." He sees them as the same questions he has been meeting in his exercises in addition. He now becomes confused. He adds when he should multiply, or multiplies when he should add, or decides correctly only by accident. Sometimes he takes his cue from the sizes of the numbers represented. When they are not widely different, he adds; when one is large and the other small, he multiplies. The accuracy of his answers is no indication of the amount of practice he is getting in recognizing the ideas. Indeed, he may be getting no such practice at all.

Another illustration of erroneous recognizing that appears correct is that of the pupil in the later grades who recognizes the term "per cent" as a command to multiply. Whenever the situation requires the finding of the per cent of a number, he multiplies and thus determines the correct answer. Apparently he gets practice in recognizing the idea of percentage. Actually he gets no such practice, for when the situation suggests a number to be found when a per cent of it is given, he usually continues to seek the answer through multiplication.

Training in looking for distinctions aids recognition. When a person trains himself to look for distinctions among the members of a class of things or ideas, he becomes able to note these distinctions more easily and surely. By way of illustration we may consider the pupil who learns to distinguish the so-called "three kinds of problems" in percentage. The three kinds are (1) finding the part of a number, (2) finding what part one number is of another, and (3) finding a number when a part of it is given. The first kind and the third kind seem much alike. The distinction the pupil considers may be: "When a part is given of a number that *is given,* multiply by the part; when a part is given of a number that *is not given,* divide by the part." The distinction of the second kind of problem may be, "Put the number the problem *asks about* in the dividend." Having in mind to look for these distinctions in a variety of exercises or problems with which he must deal, the pupil gains practice in recognizing the distinctions the problems present. In this manner the pupil develops his idea of percentage and its uses.

Recognizing distinctions helps in classifying practical applications. When the pupil has had an introduction to percentage, he moves ahead in his course to the "applications of percentage." The applications are the personal, practical, business, and social situations the pupil deals with in his studies of the topics of interest, discount, commission, insurance, taxation, and so on. These situations, though familiar to adults, are not familiar to the pupil. He must study them. He must act them out, if not actually, at least in imagination. And he must not confuse them. He must give attention to each as a practical activity that is important in its own right.

In the pupil's study of the applications, he discovers that each differs from every other, both from a personal standpoint and as a social or business transaction among people in the practical world of adults. And because he must study each as a situation by itself, he is inclined to view each for what it actually is—namely, a separate and distinct situation. As he proceeds, he tends to become confused with the apparent multiplicity of different situations, though they rarely exceed ten or a dozen in number. He tends to rely upon a few rules that he can remember or upon certain rule-of-thumb methods for finding the answers to the problem exercises.

The pupil who comes to the study of the applications with the distinctive features of the three kinds of problems well in mind possesses a framework for the organization of the various separate applications he must study. He can classify each as an example of one or another of the three kinds of problems. To illustrate, the topics of interest on borrowed money, discount on purchases, and commission on sales classify as related situations under the heading of problems of the first kind. Thus, these topics become clearer because their common classification emphasizes a common usage.

Summary. The number work of the school must guide the pupil away from direct perceptual experiences to ways of combining them into new ideas. It must train the pupil in the recognition of these ideas in situations. The following were the main points of the discussions:

1. Primitive number ideas were based upon perceptions.
2. Ideas of arrangement derive from perceptions.
3. Familiar situations give practice in the perception of ideas of arrangement.
4. Early perceptions often come from insufficient cues.
5. Training in looking for distinctions aids recognition.
6. Recognizing distinctions helps in classifying practical applications.

Chapter 13

Experiencing Meanings

Purpose of the chapter. Instead of presenting a united front in their attack upon the problems of educating children and youth, many teachers in our schools have divided into two opposing camps. On the one side, there are the teachers who require their pupils to stick closely to the words of the textbooks, and find little time or occasion to provide or even to mention concrete experiences. On the other side, there are the teachers, who fill the school day of their pupils with things to do, objects to handle, and situations to experience, and neglect the words of the textbooks because they seem far removed from the actualities of the everyday world. Each group seems keenly aware of the shortcomings of the other, and each is ready to charge the other with shortness of view and narrowness of method. Each actually finds in the views and practices of the other so much to attack that frequently the two groups obscure the education of children and youth by the smoke screen of their opposing philosophies.

It is at this point that the thoughtful teacher encounters one of the most baffling problems of education. He knows that the memorization of the words of textbooks for more or less verbatim reproduction is a delusive and insidious form of pseudo learning. He knows that personal experience is limited in the lessons it can teach to the few, though impressive, lessons that may result from the primitive method of trial and error. And he knows that meanings have their origin in experiences and receive their development through the combinations that words provide. To teach, he must employ experiences; but the thinking of his pupils must transcend personal experience. To teach, he must employ language; but the attention of his pupils must go back of and beyond the shapes and sounds of words. How can he resort to personal experiences without encouraging the superficiality which is their chief characteristic? How can he stimulate the use of language without encouraging the verbalism into which it so often falls?

This problem is the motivating force of the discussions of the present chapter. Throughout the discussions the problem appears from various angles, resolved in terms of the relations that exist between experiences and meanings, between experiences and words, and between words and meanings. The term "experiences" includes the indirect as well as the direct experiences. The chapter pursues a double theme—namely, (1) the origin of meanings in direct experiences, and (2) the growth of meanings which language may stimulate in indirect experiences.

1. *Meanings from Direct Experiences*

Meanings arise in experiences. The meaning of a thing or situation to a person is in his attitude toward the thing or situation. The meaning is the way he feels about it, or how he reacts to its presence. Meaning, in short, is personal response. A person's response is his experience with a thing or situation. Thus, we may say, the experience a person has is the meaning he has. As his experience varies, so does his meaning.

The identity of experience and meaning appears in infancy. The infant's first contact with an animal, such as the cat, may illustrate. The cat—the interesting, unusual, strange, and active thing —takes the infant's attention, arouses his curiosity, and stimulates his response. The infant reaches out to pet the cat, and the cat purrs. The whole series of acts of both cat and infant is a complex experience. In this instance, it is one of pleasure. There is much resulting attitude, feeling, reaction, and response. All these combine into the meaning the experience gives. Now, let the experience differ, and the meaning changes accordingly. Suppose, for example, that when the infant reaches to pet the cat, the cat scratches. The experience is now vastly different, and its resulting meaning is different. There result the feeling of surprise and shock, the attitude of disappointment and frustration, the response of pain, and the reaction of violent withdrawal. The result, in short, is a vastly different meaning.

Mere experience may be confusing. The situations of the everyday are abundant and confusing. They pull attention in all directions. They stimulate all sorts of attitudes and reactions. They leave a person uncertain as to where he should turn and as to the way he should act. If he does not have at hand some counterforce in the form of an idea or a purpose, something to serve as a neutralizing agency, as it were, he is apt to founder in the sea of his own personal experiences.

One of the causes of confusion from experiences is the fact that they do not come along in sequence. The order of their appearance does not suggest the relations that may exist among them. Instead of each supplying a meaning for another, each is apt to complicate the meaning of the other. Another cause is their narrowness. Though confusingly abundant, they occupy only a narrow sector of a complex world. There are many other situations outside the scope of personal experiences that can supply clarifying meanings. If one has to rely upon his own experiences to secure such meanings, he never gets them, and so he remains in confusion. He gets to be like the blind men in the story who went to "see" the elephant. In his business, vocation, or profession, the things that touch him directly are only a small section of the total field of activity in which he plays an inconspicuous part. The small section may give him many experiences. It does not give him broad experiences.

The defense a person can set up against conflicting experiences is the defense of ignoring them. This is what he usually does. He gives less and less attention to the situations he encounters every day. He puts less and less of personal attitude and reaction into them. He gets less and less of meaning out of them. In the course of time, he "gets into a rut." He takes his experiences as a matter of course. Finally, he is at the point where he is unable to note significant meanings in the things and situations that are immediately before his eyes. The pasture on the other side of the fence always seems the greener. He does not hear the knocking of opportunity at his door.

Words make experiences distinct. In the midst of the confusingly abundant experiences of the external world, the individual in civilized society has at his command the use of words. Words serve as ready-made devices for bringing order out of confusing experiences. Words give distinction to what otherwise is a mass of unrelated details.

A word, or a name, for an experience sets it off from others and makes it an object for special attention. A person is inclined to put more of his attitude into an experience with a name. In consequence, he is apt to get more reaction of meaning out of it. Or, to put the matter more explicitly, a word is an incentive to concentrate attention upon some one particular phase of an experience which would otherwise be lost in the whole mass of impressions that surround it. Thus, from his specialized attention, a person gets a definite quality of meaning which he might otherwise never enjoy. Without words, significant details of experiences might never come to the center of his attention.

A word, or a name, for a thing fosters the development of a concept. It raises mental activity from perception to conception. When a child is learning the word *chair,* for example, he learns it in the presence of particular chairs. He thus is inclined, for the time at least, to associate the word only with this or that particular chair. As time goes on he is given the word, or he hears it used, in connection with other chairs of different shapes and sizes, but always with an article of furniture that has a distinct use that is common to all chairs. From this comes his first definition: "A chair is to sit on." He may on occasion call a couch a chair, because a couch is frequently "to sit on." But here the name *couch* serves to direct his attention in a different way. Finally, the distinguishing feature of all chairs in general becomes the center of attention. To furniture with this feature he finally attaches the name *chair.*

Words are learned through imitation. Part of the total bodily reaction to a situation is the tendency of the vocal apparatus to produce sound. The result may be an exclamation of surprise, or fright, or anger; or it may be an imitation of sound, such as "bow-wow" for *dog* and "quack" for *duck*. Instinctive cries and imitated sounds may explain the origin of some of the words in our language. It is true that with only a little encouragement the child will adopt sound signs like "bow-wow" and "quack." Yet these sound signs are the spoken words which the members of the older generation pass along to him. In the presence of the dog, or the duck, he gets the appropriate name, usually from an older person. It is this name that the child tends to imitate as part of his reaction to the situation he experiences.

The child is not born with an instinctive predisposition to speak any particular language. A child of American residents in a foreign country learns the language of that country as well as the speech of his parents, and a child of foreign parentage in America learns the language of the community where he resides. Left to himself, the child would be able to produce no more than the cries and sounds that are the product of natural tendency.

The impulse to speak is instinctive. The child makes sounds to attract attention to himself. He produces various modulations of tone for the expression of his feelings. He uses one tone for the cat and another for the dog. His impulse to speak is as natural as his impulse to move about. The infant exercises his vocal cords as well as the muscles of his arms and legs. In this way he learns to control both. He gradually extends his practice to the making of the sounds he hears from the people around him. He notes the effect of his imitated sounds upon others, and he thus begins to gain the social, as well as the individual, significance of the words he imitates. In short, his acquisition of words is a matter of imitative behavior which social influences stimulate and guide.

Words are conventionalized signs. Words are more than sounds to imitate. They do something to a person. They have a character which mere sounds do not possess. What is their special nature and peculiar characteristics? How did they start? How do they get to be what they are?

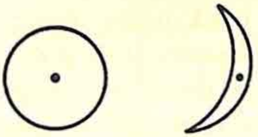
The relation between language signs and the meanings they represent is at first fairly close and direct. Later relations are somewhat remote and indirect. The development of gestures and the development of written language illustrate.

The first gesture is an elaborate pantomime. If a person enters a store in a foreign country, he uses all his motor resources to convey the idea of the article he wishes to purchase. Similarly, primitive man, to convey the idea of hunger or desire for food, enacted the breaking up of food, carrying it to his mouth, chewing, and swallowing. He expressed the idea "sleep" by closing the eyes and nodding, and the idea "fire" by a spiral upward movement of the hand.

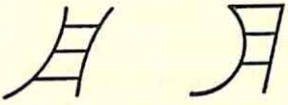
Later gestures are simpler. If a person re-enters the foreign store to repeat his original purchase, he finds that the clerk catches his idea before he can repeat the pantomime he had to enact the first time. He does not need to complete the original dramatization. Still later, he may inform the clerk of his desire by enacting only a simple vestige of the earlier elaborate gesticulation. Similarly, the pantomime of primitive man for "food" or "hunger" came finally to be the simple gesture of pointing to the mouth.

As early man dropped the elaborate pantomime of his original gestures, he substituted new ideas for the original ones. Pointing to his mouth, he could suggest meaning that was far removed from the original. He could suggest that which issues from the mouth—namely, speech. Combining the gesture with pointing in a straight line away from the mouth, the Indian gave expression to the idea that only the informed person can interpret. By this combination the Indian meant "straight talk," or "truth." Conversely, a crooked line in the combination meant "crooked talk," or "lies."

Written language exhibits a similar development. At the outset, picture writing made its appeal to the eye. The picture signs approximated the forms of the things they represented—picture of a bear for the idea "bear," for example—and they depicted as much as was possible of the whole event. Later, the picture forms were simplified in order to make their production easier, and only enough of the original form was retained to make distinctive representation possible. Thus, the horns of cattle remained in the drawing, in substitution for the original picture of the whole animal, as the sign for cattle. What was once a crude picture became in the course of time a conventional sign which conveyed a meaning only to the informed. The change in the writing of the Chinese is illustrative of this development. For example, the ancient signs for the sun and the moon pictured their characteristic shapes:



The later signs were simplified forms of the original:



The later signs do not suggest in their form the ideas they express.

The simple signs of picture writing often represented ideas by suggestion and implication. Thus, the Indian represented "old age" by wrinkles, "bad" by an abnormality, "peace" by clasped hands, "war" by two arrows pointing toward each other, and "much" by a heap. Similarly, the Pueblo Indians represented "summer" by a picture of a tadpole, since pools of water in summer were full of tadpoles. In this instance, the sign of a single condition of summer suggested the idea of the season. In similar manner, the Egyptians used the picture of a basket to suggest the idea of "plenty."

Spoken words in all probability have developed similarly —that is, from signs representing obvious meanings to signs representing meanings that cannot be directly indicated. We have no records of the earliest forms of words. A word when spoken is lost in the air unless it is preserved by the modern device of the phonograph. Yet we do have many spoken words whose known meanings have changed in the course of experience. For example, the word *grafter* once meant "worker"; and the word *gossip* originally was *Godsib,* meaning "godparent." The meanings of these words are now far removed from their early connotations.

Words arouse meaning reactions. In the two words just mentioned is much personal attitude. The attitude is immediately present. We do not need to recall experiences with the kinds of persons the words name. The words give us attitude without such recall, or before we can make the recall. Words as well as experiences are arousers of meanings.

In the arousing of meaning a word comes to take the place of an experience as an effective substitute. This happens when meaning has once been provided. At the outset, the meaning arises out of experience; later, it derives from the substituting word. To illustrate, let us return to the infant who is having an experience with the cat. The way he responds is a major part of his experience. We may diagram the connection thus:

Experience → Meaning

With the child's experience goes the word *cat,* which a member of the older generation provides him. The sound of the word and his own sounding of the word are thus a part of the total experience which includes his meaning reactions. We may diagram the enlarged experience thus:

$$\begin{tikzcd}
\text{Experience} \arrow[r] & \text{Meaning} \\
\text{Word} \arrow[ur] &
\end{tikzcd}$$

Now, at any later time, a repetition of the original experience may arouse the identical meaning response. Or recall may arouse the same quality of meaning, though not the same intensity of meaning. Or the word *cat* may arouse the same quality of meaning, though not the same intensity. We may diagram the reduced experience thus:

Word → Meaning

From this point on, the child has a certain tendency to react to meaning and he has a relating word that can arouse the tendency. He can now attend to the word and let the experience go. For the meaning in question, he no longer needs the experience. He can turn from the experience and use the word.

Words stimulate attitudes, not images. The psychology of an earlier day suggested images as the connecting link between words and their meanings. The word, the explanation runs, arouses a mental picture. The mental picture, in turn, gives the meaning.

There are two criticisms of the mental-picture explanation of meanings. The first is that there is in every one's mind a wealth of meaning, but a meagerness of imagery. The preceding chapter has indicated the inadequate perceptual basis most of us have for even the most familiar of objects. Again, there are many words for which there are no appropriate images. If we try to conjure up appropriate mental pictures for such words as *however, therefore, accordingly, industry, bravery, to,* and *from,* we find that we can recognize a word and its meaning without the use of imagery. It is true, of course, that we have mental pictures subject to call. For the word *industry,* for example, we may picture a person or a group industriously at work. But the meaning is present before the imagery, and without any need for the imagery. We may recoil from the word *snake,* and jump at the command *watch out,* before we have any opportunity to develop what may serve as appropriate associative images. Images follow meanings; they do not explain meanings.

Meanings and words belong together. The order of the acquisition of meanings and words is not words first and meanings later. It is because pupils frequently learn words with little or no accompanying meaning that they encounter in their schoolwork many difficulties which would otherwise not be present. Pupils must learn with words. Learning with words serves the meanings of the pupils. But the pupils must first have meanings to serve. The development of the idea of dividing and the presentation of its name in primary arithmetic may illustrate.

At the appropriate time in the study of groups, the teacher raises the question, "How many twos are there in eight?" and has the pupil count out eight objects and place them on his desk:

x x x x x x x x

Now, with the question, "How many twos?" kept in attention, the teacher has the pupil count groups of two and place them separately:

xx xx xx xx

The pupil now counts the twos, and gives the answer.

When the pupil has repeated the method until he seems certain about how he should use it, he finds answers one at a time to many questions like the following:

"How many fours are there in eight?"

"How many threes are there in twelve?"

"How many twos are there in six?"

Later, when the pupil has gained the idea of the questions and the answers, the teacher gives the idea its name. He announces, "We call this *dividing*." "When we do this, we *divide*."

Similarly, in the fifth grade, the pupil deals with situations having different values, or distances, or amounts. In each situation, he assumes a common value, or distance, or amount, and determines it. A man drove ninety miles in three hours. Suppose he drove the same distance each hour. How many miles did he drive in an hour? The pupil pays attention to the supposed circumstance which is the central idea. Finally, when the pupil has solved many such situations and has the idea of the supposed circumstance in clear consciousness, the teacher provides the name: "This is the *average* cost," "This is the *average* distance," "This is the pupil's *average* grade," and so on.

Similar illustrations may come from every subject activity of the school—geography, biology, history, geometry, and all the rest. In every instance, the wise teacher refrains from introducing a term until the pupil has gained the idea or the meaning the term designates.

Summary. The origin of meanings in direct experiences and the service of words as substitutes for experiences in the arousing of meanings have been the topics of the discussions of the following points:

1. Meanings arise in experiences.
2. Mere experience may be confusing.
3. Words make experiences distinct.
4. Words are learned through imitation.
5. Words are conventionalized signs.
6. Words arouse meaning reactions.
7. Words stimulate attitudes, not images.
8. Meanings and words belong together.

2. Meanings from Indirect Experiences

Combinations of words are conventional in form. The preceding section dealt with the relations of single words and single experiences to single meanings. For the sake of discussion, it lifted the individual word from contextual associations, and thereby subtracted from the meaning it normally gives. Though the word is the unit of speech, the sentence is the unit of oral and written expression. We think and speak in sentences, or intended sentences. We do so even when we utter only a single word. When the child says *drink,* his attitude supplies what is properly the rest of an incomplete sentence. When a crowd of enthusiastic partisans on a Saturday afternoon yell *touchdown,* their feelings and bodily reactions so supplement the meaning of the single word that no auditor has to grope for additional words to complete the implied sentence. A word may name an idea, but it is the sentence that gives the idea direction. In consequence, the attempt to discuss the values of words as individual parts of speech is necessarily strained and inadequate.

What the preceding section has said about the acquiring of words and meanings applies much more adequately to the ways of acquiring words in context and to the more complete meanings that go with such words. The structural relations of words in sentences serve as arousers of ideas quite as much as do the words themselves. These forms are as conventional as words. They are learned through imitation as are words. They arouse and express different meanings, though their words may remain unchanged. A change in the order of the verb and its subject turns a declaration of fact into a question in which doubt and uncertainty are the pronounced attitudes. A change in the connecting link between the parts of a complex sentence from *and* to *when,* to express time, or to *if,* to express condition, adds precision to the statement of the complex thought.

The child learns the forms of language as he learns his words. In the course of experience, he acquires meanings. To each he attaches, as experience provides, a word or a combination of words in definite structural form. Such as these words and forms are, he acquires them as they come to him. Often they are conventional only in the narrower sense of having the sanction of a limited group. The child may learn *got* for *have, ain't* for *isn't, I seen* for *I saw, where was you* for *where were you, he don't* for *he does not,* and so on. The incorrect forms come habitually to stand for the ideas for which the correct forms could just as well stand. Within the narrower group which uses the incorrect forms, they serve the purpose of thinking and expressing quite as well as do the correct forms used by society at large.

Meanings make the language forms impressive. Once a person has acquired an incorrect or inadequate form of expression, he encounters considerable difficulty in substituting the correct form. This is because the unconventional form through constant use has fixed itself in his speech. Conscious effort is an aid in making the substitution, but conscious effort frequently is at fault because it is a distraction from thinking. A shift of attention back to what he has in mind to say causes the individual to fall back upon his habitual usages. The force of habit interferes with the efforts of the school to substitute the conventional for the unconventional. In the language class, the pupil through special effort will use good form; but once he is outside the class, he lapses into the forms that he can use without effort.

Because the pupil has more opportunity to practice the unconventional out of school than the conventional in the school, it appears that the school has little chance of succeeding in its efforts to break up bad language habits. If habit were the only force in the use of language, such would of course be the case. But there is another force which often is more powerful than habit. This is the force of new meaning, which frequently overcomes habit, permitting the individual to take on a new form of expression that from the start tends to displace the habitual. New meanings for words often crowd out older meanings, and new expressions substitute for older ones. The way we adopt slang expressions illustrates. The new form carries with it a good deal of personal attitude, and its use is a kind of new experience. Its meaning, or new shade of meaning, is impressive, and makes the new form impressive. Meaning substitutes for habit as the active force.

In the primary school the pupil learns new and more adequate forms of expression through emphasis upon content. The teacher makes little attempt to teach form as such, but succeeds in making form impressive through the presentation of meanings. In preparing for reading, for example, the teacher makes content the basis of the exercises, and tells a story and has it discussed and dramatized. In preparatory social studies, the pupils discuss the community life surrounding them, and give attention to the home and community life of other people. Their various play and industrial activities give insight into the life and customs of the Indians, the Eskimos, the shepherds, the vikings, and the pioneers. Constantly, a story of one thing or another intrigues their interest and commands their attention. The language they use is the language of the story. Its connection with the central meanings makes it impressive. Its reiterated use in discussion and dramatization habituates it.

The language training of the primary school is thus informal training. It differs from the informal training of the home and playground in four respects. In the first place, it fits into a plan of work and is not accidental. Secondly, it is the product of the efforts of the teacher and the producer of the stories to use correct and adequate forms of expression. Thirdly, it is adapted in its presentation and use to constantly newer and richer bodies of content. Finally, its use in content that is selected and developed for a purpose tends to cultivate the power of sustained attention.

Meanings combine by means of words. The meanings of combinations of words in the various forms of expression do not generally derive from direct experience. In most instances the meanings result from the combinations of words. Instead of coming out of experience into word combinations, the meanings come out of the combinations and issue into experience that is indirect and imaginary. The character of words as arousers of meaning reactions makes it possible to weave meanings into new combinations of meanings.

Because a word can substitute for an experience as the arouser of meaning, a person can turn his attention from the experience to the use of the word. The word serves as a means of releasing attention from the intriguing qualities of the experience. This release makes possible a shifting of attention back and forth between two or more centers, a feat that would be impossible if a person had to rely upon his experiences and his memories of them to arouse meanings. For example, the idea of dividing grows slowly out of a whole series of experiences, as an earlier topic has shown. Likewise, the idea of the fraction as an expression of relationship has a slow growth in a long line of experiences. Now, having the two ideas and their names, the pupil can proceed with ease and confidence and understanding to the task of *dividing* by a *fraction.* We can imagine how impossible it would be for the pupil to attend to this performance if he did not have the two names, but instead tried to recall at one and the same time the two sets of experiences. We can imagine his hopeless confusion as he tried to understand the otherwise simple performance by trying at one and the same time to review the two sets of experiences. As he would recall one set of experiences, he would let the other slip from his mind. Yet he can with ease bring the two words to mind at once. Though he cannot bring experiences together as a means of combining meanings, he can bring words together and the meanings that go with them.

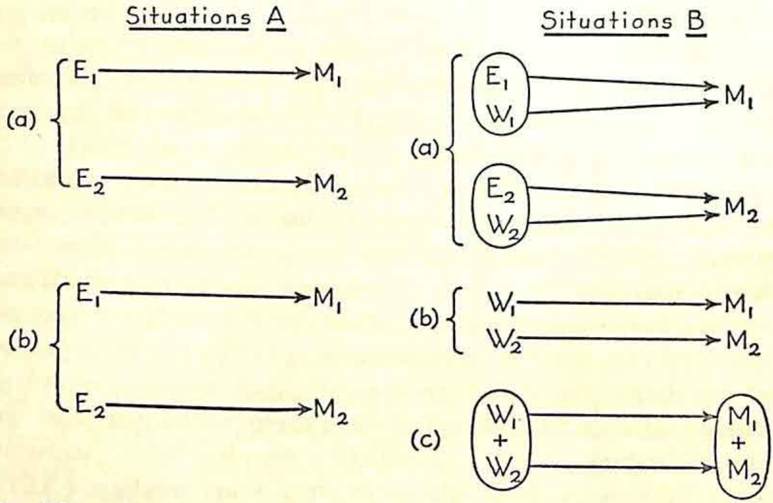


FIG. 13: *Words as substitutes for experiences and as means of uniting meanings*

We may set the matter forth in diagram. In the two sets of situations represented in Figure 13, *E* symbolizes experience, *M* stands for meaning, and *W* indicates the word. The first set of situations (Situations A) is illustrated by two steps: (a) experience one (E_1) arouses meaning one (M_1), and a different experience (E_2) arouses a different meaning (M_2); (b) the two experiences cannot come together to unite the two meanings. The second set of situations (Situations B) is illustrated by three steps: (a) each of the two experiences (E_1 and E_2) arouses its appropriate meaning (M_1 and M_2), and in addition the appropriate word accompanies each experience and attaches itself to its meaning; (b) the two words (W_1 and W_2) substitute for the two experiences; (c) the union of the two words unites the two meanings.

We may further illustrate the union of meanings through the union of words. The child in the temperate zones has seasonal experiences with snow on the ground. He derives from these experiences much personal reaction that is pleasurable. With the experiences goes the expression "ground covered with snow." In the course of experience, he learns the meaning of "always." Finally, he encounters the phrase "ground always covered with snow." He thus gains a union of meanings that is not the outgrowth of personal experiences.

Meanings grow through organization. The union of two or more meanings is a new meaning. The union is like a chemical union, not a mere physical mixture. "The attributes of psychical compounds are never limited to the attributes of the elements which enter into them," says Wundt. The new meaning may relate to the meanings that produced it—as illustrated by the meaning of "ground always covered with snow"—but it transcends the elements that produce it. Its properties sometimes correspond to those of water, which are not the combined properties of hydrogen and oxygen. Through words in combination, thinking has possibilities that rise above concrete experiences. The new meanings create experiences that exist in the realm of thought. In this manner the child in the temperate zones may gain experiences of the Arctic regions without moving from his home environment.

When two meanings come together, they form an idea of relationship. The idea may never come from contacts with experiences. The idea is a fact, not of the material world, but of the world of thought. But when we can gain it, we can bring it to our world of things and experiences as a means of organizing and interpreting. To illustrate, the child does not derive from the objects of the physical world the number ideas he uses in counting. Contact with objects, however numerous, does not produce counting. But once the child learns to count, he can count any sort and all sorts of objects. He can bring his counting to objects and gain an idea of their number.

Words in succession determine the movement of thought. William James used the phrase "the stream of consciousness" to describe the movement of thought. For our present purpose, we may borrow the figure and use it with certain modifications. Let us picture thinking as a boat moving on the stream of consciousness. Sometimes it drifts with the current, and sometimes it moves back and across and against the current. Words propel it and guide it. A word touches it here, and gives a thrust and a new direction there. The boat responds without regard to the source of the force (the meaning) of the influencing word.

A word in context does not provide all the meaning that is possible for it to arouse, not all the meaning which originally may have derived from experience. For it to do so would be too distracting; and thinking could not go forward. The word provides a *flavor* of its possible meaning. It is these flavors of meanings that combine easily into a unified larger and newer meaning of the whole sentence or paragraph.

Theory needs checking by experience. When a union of words combines meanings into new meaning, the imagined experience the new meaning provides may or may not check with the facts of the world and the realities of life. A person may put together the meaning of *horse* and the meaning of *wings,* for example, and thus extend his experiences to the fabled *hippogriff*. Yet he keeps his fancy distinguished from his facts. If, like Darius Green, he neglects to balance imagination with fact, he does not invent as did the Wright brothers. The scientist in his laboratory is as busy with his mind as he is with his hands. He is a very imaginative individual. He is a constant user of language. He combines many meanings into new combinations. The significant fact about his whole routine is that he constantly keeps his new meanings tied down to experience.

A later chapter will deal with the process of summarizing experiences—rather, the meanings of experiences—into a conclusion, or principle, or theory. We should be clear that we can do such summarizing only by means of words. And we should keep in mind that words make summarizing so easy that often summaries get out of hand and move beyond the facts from which they start. We must remember that to make a summary useful and practicable we must through constant checking keep it in agreement with the facts of experience.

Attention to content prevents verbalism. Our discussions to this point may be summarized in the following general statements. Our meanings originate in experiences. We substitute words for our experiences as arousers of meanings. We combine our meanings into new meanings. We do this so readily through the medium of language that we often carry our thinking away from reality. We need constantly to check our new meanings with pertinent facts.

We may now refer to the well-known tendency of students to accept the combinations of words in their textbooks without doing the necessary preliminary exercises to provide original meanings. Students accept the textbook combinations because of the results they secure in this manner. The repeating of ready-made phrases and sentences often meets the requirements of the classroom. Moreover, well-written language has a certain rhythm which in itself gives satisfaction. Often the student is content just to be able to roll off his tongue the sonorous phrases of his book.

The activity of repeating ready-made language is not an intellectual activity. Students learn many words in this way, but they do not learn what the words say. They make passing marks in their subjects, but they do not learn their subjects. Under such circumstances a subject often carries the blame for its uselessness to the student, when as a matter of fact the student never possessed it, and therefore could not put it to use.

The remedy is not to forsake the language of the subject and to throw away the textbook. The remedy is the obvious one of supplying meanings to go with words, meanings that words can help to put together. If the student commits to memory the theorem of Pythagoras and the language of its demonstration, for example, without grasping the meaning and the method of thinking portrayed, the fault is not in what he has done, but in what he has left undone. The remedy is not to neglect memorization, but to gain meanings and understandings. The danger of verbalism does not discount the value of words as instruments of thinking.

Language exercises must center in the organization of experiences. If language has its chief use and value in bringing meanings together into new combinations, it follows that lessons in language must be lessons in the organization of ideas. Lessons in language must of necessity be lessons in the forms of language that fit the meanings they accompany and arouse, not in the empty forms that are divorced from meanings. For these lessons there must be at least three provisions. The first is abundant and clear meanings. The second is an exact vocabulary to name the meanings and to make them distinct. The third is effort to fit the meanings together, and practice in organization. The three provisions are intimately related and are to be made more or less simultaneously rather than in the one-two-three order in which they have appeared herewith.

To provide abundant meanings for the exercise in language requires an appropriate topic. At first glance, it would appear that a selected topic is an artificial one, and that the topic used should be one that seems to choose itself. It would appear that the topic should be the one which at the time is uppermost in the students' minds—next Saturday's football game, how to draw up a set of bylaws for the student-government organization, the school fair, the latest motion picture at the local theater, and the like. All such topics are of high interest, to be sure, and they all need discussion at the proper times and places. Yet they are not highly suitable for the purposes of training, for each is a topic of more or less momentary and passing interest. They are not inclusive enough to extend over a long period of training in sustained attention. Instead of selecting topics which possess high interest that will soon fade, it is preferable to select a topic which possesses less interest at the moment, but a greater range of content that may guarantee a developing interest. This topic must be chosen by the teacher.

Another requirement of lessons in language is that the students be set to work gathering information on the topic—individually, through wide reading, and as a group, through an interchange of items of information in the class discussions.

The class discussions must do something more than provide an interchange of information. They should clarify meanings as well as build them up. The students should develop an exact vocabulary. They should train so they will not use the word *bright* when they mean "clear," or the word *clear* when they mean "polished," and so on. Clarifying meanings and developing a vocabulary go hand in hand. The training in the exact use of words should extend as much as is possible to the choice of phrases and the building of sentences. The purpose is to provide for a good final organization of ideas. If the ideas under discussion in the class exercises are finally to fit together, they need to join without too many gaps. That is to say, if the students must finally relate their ideas, they must learn something about these relations.

As students acquire meanings and clarify them and make them distinct through appropriate naming and phrasing, they should extend the language exercises to training and practice in organization. These training and practice exercises should be partly oral and partly written. Each form of exercise should prepare for, supplement, and round out the other. The oral discussion may deal with the choice of words and phrases, the proper manner of presenting the ideas, the relationship of the various points, and their logical sequence. Oral discussion is especially appropriate for these uses, because it is a ready form of expression, and because the students can easily correct and change it. Oral discussion may guide the attention of the students to words in sequence, to manner of phrasing, and to order of topical outline. Oral discussion may also serve to encourage and assist both the suspension of judgment and the arrival at a reasoned decision.

In the written exercises, the student may set down in semipermanent form what he has worked out and decided upon in the oral discussions. In their very nature these written exercises require deliberation. They suggest a fixity of form that cautions the student to be deliberate about what he is trying to say. They encourage an exactness the student may never attempt in oral discussions alone. Taking notes on his oral discussions, however, the student can prepare for more exact oral discussions than were possible at the outset. In short, the concurrent and related use of speech and writing leads to a readier and more exact use of both. Each aids the other. Oral discussion trains in readiness; written discussion trains in exactness. Each can assist the other, back and forth, until the content of the topic is exhausted. Finally, a written presentation of the results may become both a tangible monument to efforts put forth and a record of accomplishment.

Summary. The following main points suggest the development of meanings and the creation of new meanings from indirect experiences:

1. Combinations of words are conventional in form.
2. Meanings make the language forms impressive.
3. Meanings combine by means of words.

4. Meanings grow through organization.
5. Words in succession determine the movement of thought.
6. Theory needs checking by experience.
7. Attention to content prevents verbalism.
8. Language exercises must center in the organization of experiences.

Chapter 14

Extending Experiences

Purpose of the chapter. The present chapter carries forward the discussions of the development of new meanings to a consideration of practical applications in the curriculum of the school. It describes imagination as the vehicle which transports the pupil to a view of the situations and events that are far away from his immediate environment and from the age in which he lives. It points the attention to the school courses in geography and history as activities to train the imagination of the pupil and to aid him in using it with increasing effectiveness. The discussions of the chapter center in two main topics—namely, (1) stimulating the imagination, and (2) training the imagination.

1. Stimulating the Imagination

Language stimulates imagination. Language is the chief means the school uses to stimulate the imagination of the pupil in the classes in history and geography. This fact is evident even to the casual observer. In the primary grades, the storytelling by the teacher, sometimes followed by discussion and dramatization, is a major activity. In the later grades, the reading of the story, as the pages of the pupil's book reveal it, is a major activity. Other devices also come into use. These merely supplement the device of language. They merely serve to emphasize the importance of the spoken and written word.

The oral story by the teacher becomes of less relative importance as the pupil learns to read. The written story becomes more and more important as the pupil reads and improves in his reading. In geography, as in history, experience broadens through extensive reading. Reading is the chief learning device in the later grades of the school. In the earlier grades, when the pupil is learning to read, it has its limitations.

Language gains support from other devices. There are two reasons why the school resorts to the use of supplementary devices to aid in stimulating the imagination of the pupil of the history and geography classes. The one is the limitation of reading, the chief language device, in the earlier grades and, for poor readers, in all grades. The other is the added vividness other devices usually supply.

In the primary grades, when one of the major tasks of the school is to teach children to read, much so-called play and industrial activity supplements the language activity. The purpose of this supplementary activity is not to make the class exercise similar to the activities of the playground and recess periods, and it is not to keep the pupils busy. The purpose is rather to supply the stimulus that is lacking in the reading activity during the period in which the pupils are learning to read. Beginning pupils are limited in their reading development and in their general language development as well. They are not able to attain the fullest possible appreciation of the life of the peoples they study merely through the medium of language activities. They extend their experience to a simple understanding of the life of the Indians or of the pioneers, for example, if they receive guidance in an imaginative reproduction of the lives of these peoples. To illustrate, playing the games Indian children played may encourage the forming of a clearer picture of Indian life than is possible otherwise. The making of tools and utensils of early peoples gives some insight into the crude conditions of their life. The pioneer cabin on the sand table or in a corner of the schoolroom may impress the fact that the early settlers lived different lives from ours and lived under different conditions. The building of a playhouse may open discussion of the home life of peoples in other lands.

In both the primary and the later grades, the pageant and the historical drama have a wide use. The preparation incident to the final production of these activities requires the collecting and sifting and organizing of much material. Details of social life, of business and industrial activity, and of costume, which would otherwise escape the pupils, become the centers of attention. Finally, the enactment of the pageant or the drama gives both actors and spectators a vividness of impression that a mere language form of presentation could not possibly supply.

The picturization of the life of other times and places also supplies vividness. Both the pictures in the textbooks and the educational motion picture provide a stimulus to the imagination that is an impetus as well as a supplement to the stimulus of language. A historical movie may sometimes teach certain pupils more history in an hour than they can learn from the textbook in a week.

Supplementary devices frequently defeat the ends of learning. All too often the interest and the vividness of the supplementary devices serve to defeat their ends. They are so interesting and vivid that all too frequently they are matters of enjoyment and enthusiasm of the moment only and wholly in their own right. The primary pupil at work helping to build an Indian village on the sand table, for example, may become so absorbed in the materials he handles and the representation before his eyes that he does not use his mind to imagine an actual Indian village. When he is so absorbed in the mere surface features of his activity, he lives only in the here and now, not in his imagination in another time and place. His imagination receives no training either for history or for geography.

The supplementary device frequently is so immediately absorbing that it leaves little or nothing for the pupil to supply. He substitutes the play activity, the drama, or the picture—which is only a cross section and a wholly inadequate portrayal—for the more complete personal idea he would have to work out in imagination if the supplementary device were not used. He gets a vivid impression from the device, so vivid that often it is satisfying in itself. He then has no motive for supplying through the use of his imagination other needed details to complete the picture. He is willing to place his reliance on what he sees instead of on what he ought to take the trouble to work out in his thinking. He is satisfied to let the supplementary device serve as the central device, or the only device, for the stimulus of his thinking.

Reading is the chief learning device in the school. Once the pupil of the elementary school has learned to read, he may resort to the practice of reading as an important device for stimulating imagination. This is true even in those schools where reading is made subsidiary to other devices. Thus, to prepare for the recitation, the pupil must read his assignments. To prepare for a discussion, the pupil must read what he can find on the topic. To prepare for a dramatization, the pupil must read to secure the necessary information about the scene or event he undertakes to dramatize. Much more important is reading in those schools where reading is the central device and where recitations, discussions, characterizations, and the like are merely the means of stimulating, explaining, and rounding out the materials the pupil gains through reading. In such schools, reading is the chief device for broadening experience.

The need for extending experience determines the nature of the reading material. Accounts of peoples in other places in our country and in other lands carry the reader to views of how they live and produce their living. The more concrete the accounts are, the more vivid are the views. The houses, the clothing, the occupations, the products, the recreations, the adventures, the climate, the plant and animal life that surround, and other similar items of information, when they are included in stories of persons in action, give imagined pictures that extend the experiences of pupils as they read. These concrete items of information are the content of the most informative type of reading material the school provides, and they suggest what is perhaps the most valuable type of reading activity pupils may employ in extending their experience in geography. Reading materials in history that require the same valuable type of reading activity are biographies and works of historical fiction. Such books are revealing because they deal with the personal side of history. The biographies deal with facts and the historical fiction with settings and events which, though they are peopled with fictitious characters, are also true. Both types of books are valuable, not merely because they provide information, but because they carry the reader away in imagination to the life and times that are past.

Another type of reading is necessary to round out and systematize the total reading activity. This type the pupil's textbooks and reference books require. These books provide a framework or an outline in which the pupil can fit all the informative material he gains from his wider reading experience. They are constructed for ready reference. Pupils need daily to thumb them back and forth and to identify and excerpt for special study the items that are essential and important.

The reader's purpose determines the type of material he should read. The extensive reading of the pupil may be unselective and inductive or selective and deductive, depending upon his purpose as he reads. If he reads merely to find out how the story or the account is going to end, if his thinking merely follows the story or account the writer has provided, his reading is of the former type. If he reads to confirm or correct an idea that is in his mind, if his thinking controls his reading, his reading is of the latter type. In the former type, he develops an idea, a conclusion; in the latter, he seeks confirmation or denial, proof or disproof, of his idea or conclusion. To illustrate, let us suppose that the pupil, on the teacher's recommendation or for other reasons, has been reading a series of interesting stories of life in the American colonies. As he has read, he has followed each story where it has led him and his interest has been in the story as it has unfolded for him. As a result, he has gained many ideas about colonial life and has drawn many conclusions, which the stories have suggested and appeared to justify. Let us say that one conclusion suggested by what the pupil has read is that an unfavorable attitude toward English authority was developing in the colonies. And, let us say, the idea stays in his mind as a kind of challenge because it does not seem to be fully supported. We may keep in mind that the teacher has given hints of this conclusion and has suggested here and there its probability. Yet the conclusion is the pupil's conclusion, because it has some support in what he has learned. But not having sufficient support, it requires that he now read, at the teacher's suggestion and with the teacher's guidance perhaps, to find material that will give confirmation or denial. Now, the reading is selective and under the control of the reader himself. It leads toward the end the pupil seeks—namely, proof or disproof of his idea. It may lead also to other ideas that are new to the pupil, which in turn may demand further reading of the selective sort. Thus, the pupil's reading activity shifts back and forth between the inductive and the deductive.

Summary. To this point we have considered how the classes in history and geography serve to stimulate the imagination of the pupil, and how the pupil extends his experience in these fields through his developing imagination. We have considered the following points:

1. Language stimulates imagination.
2. Language gains support from other devices.
3. Supplementary devices frequently defeat the ends of learning.
4. Reading is the chief learning device in the school.
5. The need for extending experience determines the nature of the reading material.
6. The reader's purpose determines the type of material he should read.

2. Training the Imagination

The early use of the imagination is unsystematic and inaccurate. The pupil of the earlier elementary school grades has made few and narrow contacts with his immediate environment, and he has meager information about the world of the past and the world away from home. He has used his imagination very little and in unsystematic ways as means of broadening his experience. He has not had the checks upon his imagination that direct experience and wide knowledge give. Such checks as have operated upon his imagination have been sporadic ones which have come from somewhat accidental contacts with his environment and from information he has gained in haphazard ways. He has not been able to take very extended or well-guided journeys in his imagination either back into the times that are past or away from his home locality. It is true that he can recall the happenings of a year or so ago, including ones that occurred in actual journeys to places away from home, and that he can reconstruct others in his imagination. From these memories and imaginings he can proceed to other happenings which are still more remote in time and place. Yet this use of the imagination is of the simple, inaccurate sort. It places all remote events that come to his attention in the realm of the "long ago" and of the "far, far away." Any history or geography he is able to learn is of the "once-upon-a-time" or of the "way-way-off" kind.

By means of the simple, though inaccurate, imagination that the primary pupil possesses, he can learn a good deal about many historical personages and events, and about the habits, customs, and manner of life of peoples now living in various parts of the world. Though he cannot place the items that he learns in any order either as to time or as to place, he can acquire a fund of information that will prepare him for his later and more systematic studies in history and geography. He can, as it were, start to acquire the furnishings of his mental wardrobe before he erects a place in which to keep them properly sorted and arranged. As he erects his wardrobe he will have sufficient materials to occupy the hooks and shelves as he provides them; and, as a consequence, he will not have to be in possession of classifying spaces that are bare and meaningless. The primary pupil can be ready for instruction in the devices for systematizing information in history and geography, devices to which the information at hand gives a meaningful use, devices without which such information appears useless and without purpose.

The exercises in history and geography are planned to train the imagination. There are two considerations which the courses in history and geography must respect in order to serve as a useful guide to the studies of the pupil and as a proper means of training his imagination. In the first place, the courses must respect the nature of the subjects, and what a mastery of the contents of the subjects requires of the pupils. Secondly, rather simultaneously, the courses must take into account the abilities and the limitations of the learner. That is to say, the pupil can learn the subjects no more rapidly nor any better than his maturities and immaturities will permit. The following statements suggest the relation and integration of the two considerations as they apply to history and geography in the early grades.

To learn history, the pupil must learn it eventually in its time relations and as it has taken place in its large movements and causal sequences. To learn geography, the pupil must learn it eventually in its space relations and as it exists in its interactions between peoples and their environments and between races and nationalities.

Pupils in the primary grades cannot learn history and geography with respect to time and space relations, because they are unable to extend their experiences with accuracy back into time or far away from their immediate surroundings. They are not able in their earlier years to organize what they learn in history and geography in logical sequences and relations.

The two considerations explain the character of the work the teacher should plan for the pupils in the various levels of the school.

From the primary grades on, the pupils need training in extending their imaginations back into time and away from their home surroundings with greater and greater degrees of accuracy. At the outset, the school courses should make little attempt at accuracy in time and space relations. Later, as the pupil progresses, they should direct attention more and more to the placing of events and situations where they belong as to time and space. From the intermediate grades on, the pupils should have the exercises which are intended to fill their minds with larger and larger amounts of informative materials, and gradually they should move into the exercises of using these informative materials as bases of evaluation and interpretation.

Factual materials are in relations of time and space. As pupils acquire the understanding and use of number, they may give attention to dates in history. They should train in the proper use of dates, not merely as pegs upon which to hang isolated events but as a device for keeping sequences clear. Similarly, they should train in using maps to keep clear the relations of places to each other and to bring a multitude of related data simultaneously to attention.

Chronological arrangement and the use of maps depend upon preliminary preparation. The ability to use dates as a means of keeping sequences of events clear depends upon training in the use of number. It depends also upon training in the perception of time. An earlier chapter pointed out that two equal periods in history do not appear alike in duration any more than do an hour at the movies and an hour in the usual class. A period of time seems short or long according to the amount that fills it. For the pupil to perceive a given period of time satisfactorily, he must have filled it with information. Much information that the pupil learns is important in that it contributes to his training in the perception of a period of time.

Likewise, the proper use of a map requires preliminary training. A map is useful as a device for making familiar an unfamiliar region, or for making clearer the relations between locations that are already fairly familiar. A map does this by giving a representation of directions and distances. It is useful only to the person who has learned how to read the directions and distances which it represents.

Teachers frequently note that a map is a confusing device to the pupil who is unacquainted with what a map represents. They usually seek in advance of the pupil's use of maps to make him acquainted with the way he should read them. Expecting the pupil later to read meaning out of maps, they first of all see that he reads meaning into maps. Accordingly, they refer to the familiar features, the directions and the distances, of the immediate environment—the school yard, the home farm, or the city park; and they help the pupil to represent these features on a blackboard or sand-table map. Next, they present maps of familiar areas—maps of the town or city, and road maps to neighboring points of interest. Finally, when the pupil has learned to relate familiar directions and distances in a map of his own making, he is ready to study maps of less familiar and of unfamiliar regions by noting the directions and distances that relate.

Only correct methods of interpretation are useful. The present and the immediate are the starting points from which imagination extends experience. A person interprets what he learns in terms of what he has already known. He sees the unfamiliar in the light of the familiar. Just as the pupil may proceed from the familiar to the unfamiliar in the use of maps, so he may move along in his interpretations in history. When he learns of events in the past, he is inclined to place them in settings which he already knows and to clothe the historical personages who participated in the events with the characteristics of persons of his acquaintance. Familiar scenes, familiar conditions, familiar activities, and familiar persons, in varying orders and arrangements, the pupil projects backward and uses to explain the life of the past. The pupil is more apt in explaining the past by the present than in explaining the present by the past.

Correct interpretation of the past is a structure of the life and conditions of the past, not of those of the present. The pupil must learn all he can about the differences between past and present. He must fill his mind with an abundance of information about events and conditions and situations and people of the past. All this, when the pupil gains it and becomes familiar with it, is material for interpretation. This is the explanation of the wide reading program in the materials of history and geography which the first section of the chapter suggested.

The basis of interpretation must finally transcend the physical. The initial basis of interpretation and the first to strike the attention is the physical basis. Thus, an appreciation of the sturdy character of the early Puritans comes from a knowledge and an understanding of the hard conditions of their life and the sacrifices they had to endure. Thus, the explanation of the coal-mining industry in West Virginia, Pennsylvania, and Kentucky is the physical fact that an abundance of coal is in the hills of these regions. The physical surroundings and the physical conditions of an event or situation provide the obvious interpretation of their existence.

Underlying the physical is a basis that is much less obvious and harder for beginning pupils to grasp, indeed so difficult that its grasp comes only slowly and gradually. This is the basis of motive, which in geography is largely economic, and which in history is, when the facts are known, often economic. The motive explanation of the mining industry in a region where coal exists is the demand for coal by numerous industries in surrounding regions; and the motive explanation of the market-gardening industry of another region having fertile soil is the accessibility of the region to a large city population. Similarly, the interpretation of an event in history comes from a knowledge of the motives and ideals of the people of the time. It is only by such interpretation that any understanding at all can come out of many historical conditions and events. For example, the devoutness of the Puritans as expressed in the punishments they inflicted upon those who did not conform to their beliefs becomes clear only as we gain insight into their motives and points of view which came from their hard experiences. In the present day of comparative enlightenment, the attitude of the Puritans toward what they thought was witchcraft is inconceivable except as we can put ourselves in their situation. To illustrate further, it is becoming increasingly difficult to understand how there could have been any real difference of opinion over the question of slavery. The facts of the dispute do not explain the dispute. We must know and properly regard the conditions that were back of the dispute. We must consider the attitudes and motives of the people who lived a century ago. Only then can we begin to understand the controvery that shook the nation.

General ideas grow out of interpretation. Out of the interpretations the pupil makes grow general ideas in the form of conclusions or points of view or attention to this or that movement or social institution. These ideas are stimulated by suggestions the teacher may give in questions that require the recall of several items of information the pupil has gained. When the pupil brings various items of information to attention, he gets a suggestion of the relation that exists among them. The preceding section indicated the possibility of stimulating the idea of a common attitude among the colonies toward English authority, and how the pupil can use the idea in his subsequent study. Similarly, questions that require the recall of other suitable items of information may stimulate other ideas: the idea of a movement in history, such as territorial expansion or the industrial revolution; the idea of a principle in geography, such as the growth of cities; the idea of the growth and influence of a social institution, as illustrated by education or slavery; the idea of the extent of an industry, as illustrated by coal mining or automobile manufacturing. These ideas are not conclusions. As conclusions, they are apt to be thin and inadequate, if not largely incorrect. These ideas at their best are starting points for more systematic studies than the pupil has as yet been able to undertake.

Summary. Suggestions for the training of the imagination of pupils in the classes in history and geography have developed in the discussions of the following topics:

1. The early use of the imagination is unsystematic and inaccurate.

2. The exercises in history and geography are planned to train the imagination.
3. Factual materials are in relations of time and space.
4. Chronological arrangement and the use of maps depend upon preliminary preparation.
5. Only correct methods of interpretation are useful.
6. The basis of interpretation must finally transcend the physical.
7. General ideas grow out of interpretation.

Chapter 15

Attending to Abstractions

Purpose of the chapter. The intelligent citizen is an informed citizen. He knows about his community—the narrow community of his village or town or city, and the broad community of his state and nation, their interdependencies and their relations to other lands and peoples. He knows about the institutions which society through the ages has built and which surround him from birth as controls and guides of his thoughts, feelings, and actions. He knows about conflicting interests of social groups and about some at least of the major social and economic problems that result. He knows about the world in which he lives. He knows it as a physical world and as a world of ideas.

Information about the world has come to the informed citizen largely through the medium of the printed page. Through reading he has taken himself away from his immediate surroundings and viewed parts and phases of life in the world that are not visible to his physical eyes. Through reading he has seen the world, or here and there a selected part, from two angles: the angle that gives a view of the qualities of things, movements, or institutions; and the angle that gives a view of their quantities, sizes, and proportions. Without the two views, he is uninformed. With only one view, he has a lopsided or distorted picture.

In presenting a double view of the world, the printed page deals with two kinds of symbolic language: the language of the alphabet and the language of the Arabic numerals. The informed citizen reads both languages. One reason why many citizens are inadequately informed and consequently confused is that they read the former language and are illiterate in the latter. They can read the descriptive account of an institution. They cannot grasp its magnitude when numbers larger than a few hundreds express it.

The citizen who is illiterate in the language of quantity is a product of the school which sought to give him instruction in the Arabic numerals. He has dealt in numerals since his first day in school; but somewhere along the line he has failed to grasp their meanings. At some point or at several points his instruction was deficient.

It is the purpose of the present chapter to canvass the school courses in arithmetic and algebra, or rather the psychological bases of such courses, to locate the points of deficiency. The chapter will describe arithmetic and algebra as systems of abstractions and will indicate the peculiar difficulties pupils meet in giving attention to abstractions. It will suggest means of avoiding the difficulties of abstractions through the development of adequate meanings for them. The discussions will center around three main topices—namely, (1) the nature of abstractions, (2) the symbolism of abstractions, and (3) systems of abstractions.

1. The Nature of Abstractions

Abstractions are products of active attention. The characteristic contrast of active and passive attention suggests the most striking characteristic of abstraction, both as a process and as a product. In a state of active attention, as an earlier chapter has said, the mind goes out and seizes the situation at hand; in a state of passive attention, the mind permits the situation to seize or take possession of it. Similarly, we may say, abstractions do not come into the mind as impressions from the external world. Objects and actions, not abstractions, impress the individual. From this point on, he creates his abstractions according to the way he puts forth his conscious effort to develop them.

Number thinking is an excellent illustration of the process of abstraction. When a person counts, for example, he deals with his impressions instead of letting them deal with him. Suppose he glances around the room to gain an idea of the number of chairs from the impressions a mere glance may give. He may be aware that there are "several" chairs in the room, more perhaps than are in an adjoining room. Yet he does not determine by the glance the answer to the question, "How many?" The chairs as objects are familiar, but their number is not self-revealing. Suppose he now counts the chairs. Now he does more than passively receive impressions. He handles the impressions. He organizes and arranges them. He gives to them a very definite type of active attention. He does not move the chairs objectively, of course, but subjectively he thinks them together as a single group or as a series of groups. Thus he determines their number. In no sense do the chairs impress their number upon him.

The fact that the abstract idea of number does not spring from objects and situations to take possession of the mind may have several illustrations. The presence of objects does not make them countable; the possibility of counting is brought to them by the individual who has learned to count. Playing store does not project addition to be learned; the child brings addition to the store game only after he has learned to add. A view of business practices does not reveal the idea of percentage; the person who has the idea reads it into the business practices to make them meaningful. Number ideas do not come out of the physical world; the individual who has conceived number ideas carries them to the physical world to give it order.

The illustrations at first glance seem difficult to grasp. As adults we have counted and added and thought in terms of per cent so long that these processes seem to be "natural" with us. When we give attention to objects, we "naturally" count them; when we buy at the store, we "naturally" add and subtract; when we compare values in a business arrangement, we "naturally" translate the comparisons into per cents. The truth is that we have become so accustomed to wearing the intellectual glasses of number thinking that we fail to consider how much they color the objects and situations that surround us. To us objects appear countable, addition appears to be a part of the store game, and percentage appears to be an element of certain business practices. Forgetting our long possession of the glasses we wear, we fail to realize how different the appearances of things must be to those individuals who may not as yet be in the habit of wearing the same kind of glasses.

Abstraction is the process of centering attention upon a single element or characteristic. Many persons consider abstraction a mental activity that is somewhat withdrawn from reality. They contrast it unfavorably with the thinking that applies to concrete things and objective activities. They say, "Such and such is abstract, it isn't concrete," to condemn the type of thinking or the product of thinking which they feel is vague or impractical. They make abstraction synonymous with theorizing, or mind-wandering, or woolgathering, and the opposite of clear, tested, straight thinking.

The truth concerning abstraction is much to the contrary. Abstraction is thinking of a highly practical kind. It involves a concentration of attention that avoids vagueness and makes possible practical results. Its nature is indicated in its etymological meaning. "To abstract" is "to draw from," "to separate"—that is, to withdraw from a whole thing or situation a single element for special study and attention.

If we look in the dictionary we find *abstraction* defined as an act or process of leaving out of consideration one or more qualities of a complex object so as to attend to others. Thus, when the mind considers the form of a tree by itself, or the color of the leaves as separate from their size or figure, the act is called *abstraction*. So, also, when the mind considers "whiteness," "softness," "virtue," "existence," as separate from any particular objects. Abstraction separates the parts or qualities of things wholly for the sake of considering them in themselves, or in their relation to like parts or qualities in other things. Abstraction, says the dictionary, is thus necessary to classification, by which things are arranged in genera and species; for in classifying we separate, in idea, like qualities of certain objects from other qualities which are different, and arrange the objects having the same qualities in a class or collected body.

The essence of abstraction is then its "drawing away" of a single element from a complex object to the neglect, for the time being, of other elements. Abstraction is a separation for special study of a single phase or part from the whole. Thus, we neglect the thorn of the rosebush and give attention to its flower; we neglect the appearance of a speaker and listen to what he says; we neglect the musician and concern ourselves only with his music; we neglect the size and shape of the objects we count and concentrate upon their number; we neglect the width of the real line and treat its length as a geometric line that has no width. Abstraction is synonymous with concentration.

Abstractions are separated from particular objects. The fixing of attention upon a single element of a total complex object leads to an idea of the element that would not otherwise develop. Attention upon similar elements in other complex objects develops the idea until it stands in the mind with an identity of its own and without special connection with any particular object or circumstance. Such an idea is an abstraction.

Kindness, for example, is an abstraction a person builds out of many experiences of kind deeds rendered to himself or to others. In the course of these experiences he abstracts from the total deeds the single element which he has learned to denote as "kind." The use of the terms "kind" and "kindness" assists in centering attention upon the characteristic element. Paying attention to it, he neglects, for the time at least, other elements, such as benefits conferred, gains received, and the like. Finally, kindness comes to stand in his mind as a meaningful and usable idea that is detached from particular circumstances. This is one of its cardinal advantages. Because it now stands detached from any particular circumstance, because it is not tied down to any particular deed, it can readily attach to this, that, or any other deed of kindness to which the person may associate it.

Conversely, the detachment of the idea may be a cardinal disadvantage. A person may become so absorbed in his contemplation of kindness in the abstract as to be unwilling or unprepared to give the idea concrete manifestation in any particular deed of kindness. It is at this point that abstractions come into disrepute. Really, the fault is not with the abstraction, but with the person who becomes complacent with its mere possession. The person does not avail himself of the advantage which the detached abstraction gives of making ready application of his idea of kindness to new and changing circumstances. The person who is kind sees opportunities for acts of kindness that go unnoticed by his more obtuse associates. He is disposed toward rendering acts of kindness that do not occur to his less considerate friends to perform. He has developed the abstraction we call kindness, and he seizes the advantages which the abstraction gives.

Perhaps nowhere else does the detachment of an abstraction show to better advantage than it does in the case of number. A given number idea, ten, for example, is not a quality of objects. It does not relate to things, to persons, to acts, to situations, to anything. Because it is so unrelated to any particular, so detached from all particulars, it can be related with greatest ease to all possible things, persons, acts, or situations. We may think of ten dots and the next instant of ten dollars. We feel no hesitation in making the transition. Similarly, when the child learns to count, he is not tied down to counting any particular objects. He counts the buttons on his coat, the plates on the table, the pictures on the wall, the persons in the room, the trees in the yard. Later, when he learns other number processes, he can deal with each in any situation of which it may be a part. Thus, when he learns the dividing of a large group into smaller equal groups or parts, he can use dividing with any group of any kind of objects he may be called upon to divide.

Underdeveloped abstractions have limited applications. Wide application of abstractions is possible only with developed abstractions. Partially developed abstractions, abstractions which are still tied down to particular cases and are therefore not as yet abstractions in reality, have limited applications. The child who knows of kindness, for example, only as it connects with certain kind deeds he should render the persons in his immediate family circle, may have no idea of kindness in his relations with other persons. He may learn to perform a few limited acts of honesty, but, until he develops the abstraction of honesty, he may be unconsciously dishonest in less familiar situations. The student may learn to deal with proof in the class in geometry and still be wholly unaware of the presence or absence of proof in nongeometric propositions. Likewise, the pupil in the class in arithmetic may learn a number operation—such as dividing, finding the average or the per cent, and the like—in certain particular situations and be so impressed by the reality of the situations that he does not develop the operation into an abstraction. He is unable to apply the abstraction in new situations because he has not made it a part of his intellectual possessions. An underdeveloped abstraction is still tied down to particular situations. It cannot move along and attach to new ones as long as it remains freighted with its particular associations.

The quality of abstractions depends upon the ways they develop. With abstractions as with other matters of importance the quality of the product depends upon the method of developing it. We may illustrate this fact by reference to the difference in the character of the number ideas of early peoples before and after they learned to count.

Before early peoples had developed counting as a method of determining their ideas of the numbers of the objects with which they were concerned, their number ideas were very vague. The ideas were closely attached to the concrete, and were not highly abstract as we now know and use them. These peoples, having no ability to count, used various means of keeping track of their possessions. They gave each item a name and, like the early shepherd who knew his sheep by name, they checked the items much as the teacher now checks attendance by calling the roll of the class. They used tallies—cut a notch in a stick, tied a knot in a string, or laid aside a pebble—for each item. They knew that they had as many cows, for example, as they had pebbles in the bag they carried. They compared a given group with a known "model" group, and thought thus: "I have caught as many rabbits as the ostrich has toes," or "I have as many dogs as the clover has leaves." If they ever thought or spoke of the number of dogs as "clover-leaf," or of the number of rabbits as "ostrich-toes," they by no means thought of using these names (nouns) as counting words until *after* they had learned to count. These names belonged to things, to concrete things, and were not counting words until a method of counting through the use of designating words (adjectives) came into use. The fact that we can, if we wish, use nouns as counting words—*nose, wing, clover-leaf, ostrich-toes, hand*—does not indicate a similar ability on the part of the savage. It merely indicates that we have developed a power of abstraction that enables us to substitute with ease the names of things for number names. The savage developed some measure of this power once he had learned to count. Some of his later counting words were nouns: *hand* for five; *man* (all the fingers) for ten; *whole man* (fingers and toes) for twenty.

We may illustrate further the quality of a number idea before counting and after counting by reference to contrasting methods of using tallies. In recording the votes cast for an office in one of our clubs or societies, we frequently tally each vote as it is read. Then we know that John Smith has received as many votes as there are tallies opposite his name. This is as much as the savage knew when he scratched on stone a tally for each spear he possessed. But we next proceed to *count* our tallies. This the savage did not do until he had learned to count. All he could know was that he had as many spears as there were marks on his stone.

Even with our present ability to count and to calculate most of us have the vaguest possible ideas of certain large numbers that are in daily use in our civic affairs. We can speak glibly of millions and of billions with little comprehension of these amounts. The ease with which we can apply such amounts in our public expenditures indicates the applicability of abstractions. It also indicates the need for an occasional check on the meanings of the abstractions we possess. A later topic will call attention to this need.

Abstraction can be taught to children. Enough has been said about the nature of abstractions to indicate that instead of being divorced from the concrete realities of life they are among the most practically useful products of human thinking. At this point we may remind ourselves that the mental processes which produce abstractions are not alone the attainments of maturity, but also the possibilities of childhood. The processes of developing abstractions can be taught to children.

We have considered how children may draw out of particular acts of behavior the abstractions of kindness and honesty, and then use these abstractions to evaluate other and various acts of behavior. We shall consider in a later chapter the ways such abstractions are useful in the training of children. We shall suggest that such abstractions are the seeds of ideals or personal standards of conduct. At this point we shall cite an illustration of an everyday procedure of teaching abstraction to pupils in those school activities which at the time must employ objects that are concrete.

When beginning pupils learn the method of finding the answers to questions in subtraction, for example, their teacher sets them to work practicing the method themselves. Thus, when the question is "Two from six is how many?" the pupils count out six objects, remove two, and count the objects remaining. The procedure, though it involves objects that are concrete, is nevertheless a procedure of abstraction. The pupils neglect the character of the objects in order to concentrate upon the way to arrange them. Next, the teacher shows how to count the two objects away (in imagination) by pointing to the two with the finger of the right hand, and, without disturbing the objects, counting the four remaining, pointing with the finger of the left hand. When the pupils do this, they give attention to arrangement without actually making the arrangement except as a matter of thought. Finally, the pupils are able to give attention to the arrangement of objects in answering the question in subtraction, and in answering other simple questions, without needing to have the objects present. This type of thinking about arrangement is withdrawn (abstracted) from the use of objects. Yet it is full of meaning, coming as it does as a later step in the study of arrangement. If the teacher tries to make it a beginning step, before the pupils have studied the abstraction in its more concrete representation, it is not an abstraction at all, but merely something the pupils remember to say.

Abstraction begins with analysis of wholes. In our discussions we have noted that the process of abstraction begins with analysis and leads to generalization. We may now note that the quality of the resulting generalization depends upon the fullness of the abstraction.

When a person fixes attention upon a single element of a complex object, he must single out the element from the total situation and neglect the other elements. The more he concentrates, the sharper he must make his analysis. Though the other elements may be important for other purposes, he must put them in the background of his attention. This is to say that abstraction does not result from the attempt to give due weight to all the elements at once. To illustrate, to recognize the printed word *dog,* the beginner in reading must take his attention away from the picture of a dog and concentrate upon the appearance of the printed word. Pictures and objects in the hands of the careless teacher often serve as a distraction instead of a help. To learn what adding means, the pupil must give attention to his adding and not distract himself by attention to possible interesting applications. The beanbag game or the school store may distract as well as help. When the student in biology examines the beak of a bird, let us say, he must view it as an instrument for grasping food, as a weapon for attack, or as a means for some other use. However he views it, he must neglect all other features for the moment. The student of drawing viewing the same beak would make an entirely different kind of analysis.

Counting is a method of analysis. When a person counts, he breaks down the whole group into its individual parts. He must discriminate each object with care as he counts. He may aid his discrimination by pointing, by nodding his head, by tallying off each object on a finger. A mistake in his discrimination is a mistake in his counting. When he must count a large group, he is conscious of the need of careful discrimination—that is, of careful analysis. The least distraction during the process is sufficient to render him doubtful of the result and to influence him to make a second count as a means of checking.

We often consider counting a process of synthesis, of one-by-one adding until we reach the final result. This is a narrow view and only partly correct. Suppose we count the chairs in a classroom and determine their number as thirty-six. In a sense, we have built this total by a one-by-one accretion. Yet in another sense we have broken down in our thinking the whole group as a totality into three groups of ten and a group of six. Because we thus analyze the whole group into its comprehensible parts, we gain an understanding of the whole which would not otherwise be possible.

Abstraction leads to generalization. Abstraction is the basis of generalization. If we fail to notice the element of kindness, or of honesty, or of unselfishness, in the total course of action of a given individual, we do not reach the conclusion that he is kind, or honest, or unselfish. We may mistakenly so conclude on the basis of insufficient analysis: or by further attention to the person's actions, we may correct earlier conclusions. In any case, our generalizations take the pattern of our abstractions.

There is no guarantee that generalization always follows attention to particular cases. The pupil may be required to check addition upward by addition downward and still not conclude that the sum should be the same. The fault is not with the particular additions with which he has dealt, but with the kind of attention he has been permitted to give to them. If he does not abstract out of each particular case the *sameness* of the answers, he has no basis for any generalization relating to *sameness*. Further illustration of the process of generalization will be given in a later section.

Summary. Our discussions have used the term "abstraction" to name both a process and a product. They have dealt with the mental process of abstraction and with the qualities of the abstractions—the ideas—that result. The following topical statements indicate the trend of our discussions:

1. Abstractions are products of active attention.
2. Abstraction is the process of centering attention upon a single element or characteristic.
3. Abstractions are separated from particular objects.
4. Underdeveloped abstractions have limited applications.
5. The quality of abstractions depends upon the ways they develop.
6. Abstraction can be taught to children.
7. Abstraction begins with analysis of wholes.
8. Abstraction leads to generalization.

2. The Symbolism of Abstractions

Symbols are substitutes for experience. We have observed in earlier discussions how the use of words makes possible the development of ideas as well as their effective expression. Words, whether spoken or written, are symbols of ideas. They arouse the ideas, the reactions of meaning, which earlier experiences have provided. They combine in ways that are wholly impossible for experiences, and thus make possible the combination of meanings into new meanings which are not dependent upon costly experience.

The numerals we write have a similar use and similar value. They, too, substitute for experiences as arousers of the meanings which earlier experience has provided. They, too, serve to combine meanings. We now consider the service of symbols in number thinking.

The numerals—that is, the symbols, signs, or figures which represent number ideas—were at the outset probably no more than characteristic forms of objects which served as tallies, or counters. To assist in his labored counting, early man, as frequently do we, marked the tallies of the objects he was trying to count. As a result, he had his tallies to take his attention. A given group of tallies—| | |, let us say—related to his idea of three and, through long usage, became the sign of his idea of three. We may note the resemblance of some of the Roman numerals to what earlier must have been groups of tallies: I, II, III, 𝍸, and of some of the Arabic numerals to the cursive forms of groups of tallies: |, =, ≡, ┼.

The group of tallies, preserved as marks on the wall of a cave, served as a record of the result of counting a given group of objects. Having completed his counting, early man did not need to repeat it. He could turn to his group of tallies to remind himself of his performance. Having the idea that a group of tallies could represent a number idea, he could mark down the group as a means of making a written record of the idea. A given group of tallies through such use came finally to take on a certain characteristic form. Now, to make the record he needed merely to reproduce the form and to omit the minor details. Instead of writing the five tallies, 𝍸, to show five, he could write its characteristic feature, V. Instead of writing the four tallies, ┼, to show four, he could write its characteristic feature, + or 4. In any case, his purpose in writing was to produce a record of his thinking, after he had done it.

Symbols are aids in thinking. The numerals serve not only at the end of the thinking process, but also while it is going on. They do not do a person's thinking. They merely free his mind so that he can move along from one step of thinking to another. Numerals, like words, are the fortresses of thought. They hold a thought while one goes ahead to gain a new thought. They provide a point of departure for each new step of thinking. They serve as partial, step-by-step records as the thinking moves along.

In adding two large numbers, for example, we can proceed with as much ease and confidence as we do in adding two small numbers. To work this example, $\begin{array}{r}4248653\\ \underline{1732125}\end{array}$, we first add the ones and write the partial answer. We do not need to think of it any longer. We are free to add the next column. We add the tens and write this partial answer, and so on. When we finally come to the millions, we are free to add at that point with as much ease as at the beginning. Without the service of numerals to free the mind to take each succeeding step of thinking in its stride, the adding we have done would be extraordinarily difficult. Whenever we try to add without using paper and pencil, we demonstrate to ourselves the need of numerical aids.

Likewise, in solving an arithmetic problem of more than a single step, we can take each succeeding step as easily as we have taken each preceding step, or as easily as we work a simple one-step problem. We take the first step and record its partial answer. We then can take the next step without thought of our effort in taking the first. We thus may proceed, however complex our problem may be. Through the service of numerals we can resolve any such complexity into a series of single steps.

Symbols may be learned apart from the meanings they represent. What we have said about the service of numerals is true only when they carry meanings for us. When they do not and we fail to understand their use, instead of helping us in our thinking, they become a hindrance.

Ample demonstration of the contrasting influence of numerals occurs in every classroom. We may see side by side two pupils, in all other respects equally bright, but one finds his arithmetic work challenging and interesting, and the other finds it unappealing and dull. To the one, the work is intellectual play; to the other, it is intellectual drudgery. The key to the contrasting attitudes is the fact that for the one pupil the numerals represent number ideas, but for the other they are merely signs that are to be moved around as the teacher and the book have set the rules. The latter pupil has learned the symbolism of number without learning number. Instead of engaging in the use of the number language as an instrument in thinking and expressing, he is merely indulging in a kind of numerical verbalism.

The pupil can learn the verbalism of the language of quantity as easily as he can learn the verbalism of the language of quality. About as many pupils indulge in the one kind of verbalism as in the other. The course of least resistance for the pupil is to connect the oral language of number with the written language of number and to omit connecting either with the idea or meaning both should represent. Besides, this kind of response gives the appearance of learning. When the pupil recites, "Two and three are five," and simultaneously writes, $\begin{array}{c}2\\ \underline{3}\\ 5\end{array}$, it seems that he has learned something in number. Actually, he may have. He may have related each statement, the oral and the written, to the idea of grouping that came from counting a group of two and a group of three together, and thus have brought the two statements into relation with each other. If he has made these relationships, he has learned both something in number and the ways to express it. On the other hand, he may merely have remembered that each form of statement goes with the other. That is, he has learned a part of the symbolism of number, but nothing in number to give it life and meaning.

The use of symbols to stand for meanings is sometimes difficult for beginners. Sometimes the situation we have been indicating is in reverse. Sometimes the pupil develops the number ideas, but not the symbols which represent them. A fifth-grade teacher, for example, in the effort to develop a method of teaching the ideas of size and number in the common fractions, found considerable discrepancy between the possession of the ideas and the ability to recognize their symbolic representation. In a preliminary test, he thought he had discovered that his pupils knew very little about the relative sizes of the parts of things. They made many blunders in recognizing the largest of three written representations, such as $\frac{1}{2}, \frac{2}{3}, \frac{1}{4}$ and $\frac{2}{4}, \frac{2}{8}, \frac{2}{6}$; and the smallest of three written representations, such as $\frac{2}{3}, \frac{2}{5}, \frac{2}{2}$ and $\frac{1}{4}, \frac{1}{2}, \frac{1}{3}$. Actually, they made almost twice as many incorrect estimations as correct ones. Yet, when the teacher began his instruction, he discovered at once that the concrete representations of the sizes of the common fractions—one-half of an apple, two-thirds of a circle, and so on—were not unfamiliar to the pupils. Indeed, when he gave them the opportunity, most of the pupils were able to provide ample illustration of concrete representations from their own experiences, and to give clear evidence of the possession of the meanings of the fractions whose written representations had been confusing. It was clear that much of the difficulty of the pupils at the outset was not with the meanings of the simple fractions, but with the written language of fractions. Moreover, such written language as they had learned had been acquired somewhat apart from the ideas it was supposed to represent.

The beginning student in algebra has similar difficulties with the algebraic symbolism. He may have some conception of what we mean by the expression "any quantity," and he may use a given letter to stand for a given particular quantity, but for some time he is not clear on the point that *a, b, c,* etc., each represents "any quantity." To him *a* is simply a letter of the alphabet, seen when written, heard when spoken—a concrete object in his experience. How can the particular letter *a* represent *any* quantity? His teacher must take considerable pains to point out the connection between the new symbolism and what the student has already learned about quantities and their relations in arithmetic. Otherwise, the student may proceed far into the course, writing algebraic expressions and manipulating letters, without realizing that algebra is anything more than a meaningless set of rules concerning the ways he may transfer meaningless letters back and forth across the pages of his notebook. He may even pass his course in algebra and still think, as have others before him, that algebra is a kind of literary subject.

Symbols make possible abstractions that are far removed from concrete experience. The beginning number ideas—ideas of small amounts—have their basis in concrete reality. They attach readily to the small groups from which they have been abstracted. A person can "visualize" the ideas, or so it seems. Thus, the idea "three" relates closely to an actual group of three which he can readily picture in his mind and recognize as a distinct group. He may do the same with respect to other number ideas up to eight or ten. The ideas beyond ten he can recognize in actual groups only through some form of analysis. To picture the idea "sixteen," for example, he sees or conceives it as ten and six, eight and eight, four fours, and so on. He must recognize larger groups by the one-by-one analysis of counting.

Later number ideas—ideas of large amounts—also have their basis in concrete reality, but only indirectly so. Ideas of large amounts do not derive directly from the very large groups, or amounts, which they represent. A person's idea of a thousand or a million does not derive from counting a thousand persons or a million dollars. Whatever are his ideas of these and other large amounts, he has built them up out of his ideas of smaller amounts. He comprehends the idea of a thousand as ten hundred when he has the ideas of ten and hundred. His idea of a million is the complexity of his ideas of smaller amounts: thousand thousand, ten hundred thousand, and so on. He could never gain the idea of thousand and million if he had to depend upon direct sensory experience. Ten pencils or ten fingers at the outset of the pupil's training provide a basis for the idea of ten. A hundred objects, except as he deals with them as ten tens, let us say, confuses him in trying to build the idea of hundred. The idea of thousand and million are several steps removed from concrete experience.

The symbolism of algebra makes it possible for the student to move with considerable speed away from concrete experiences. In algebra, he can set down a letter symbol to stand for "any number" and then can deal with it the ways he has learned to deal with the symbols that represent particular quantities. He can add, subtract, multiply, divide, raise to a power, or extract the root of "any number" just as though it were a particular, definite number. By manipulation in various combinations of "any number," he develops acquaintance with the laws of combination and confidence in the processes of combination. Finally, he reaches the point where in a problem situation he can treat the unknown whose value he is seeking just as if he had known its value from the outset.

To be useful, symbols need to have a solid basis in meaningful experience. How readily one can move away from the concrete into the realm of the abstract is illustrated in the easy thinking of the ordinary citizen about millions and billions. He can read about them, talk about them, and compute with them, just as though he comprehended them; but he is very frank to confess that they are "beyond" him. He speaks of them as "astronomical," because the comparison of unknown with unknown gives a slight feeling of familiarity. Moreover, when he becomes serious about their magnitude, he tries to bring them down through comparisons to smaller amounts that are within his comprehension. This is helpful if he does not get lost in the comparisons. To be told that it takes a clock 31 years to tick off a billion seconds, or 1901 years to tick off a billion minutes, impresses magnitude without aiding comprehension. Frequently, he works the large amounts down until they may be stated in terms of himself, the ordinary citizen. He may interpret the national budget of sixty billions as a personal charge upon himself of $400. He may interpret a national debt of 240 billions as a personal debt of $1600. Only through comparisons like these do the "astronomical" amounts return to the realm of personal experience.

Summary. The advantages and the pitfalls that pertain to the symbolism of abstractions have been discussed under the following topics:

1. Symbols are substitutes for experience.
2. Symbols are aids in thinking.
3. Symbols may be learned apart from the meanings they represent.
4. The use of symbols to stand for meanings is sometimes difficult for beginners.
5. Symbols make possible abstractions that are far removed from concrete experiences.
6. To be useful, symbols need to have a solid basis in meaningful experience.

3. *Systems of Abstractions*

Arithmetic is a method of thinking. The arithmetic we teach pupils in school is a way to think about the numbers of things—about quantities, amounts, sizes. It involves the questions, "How many?" "How much?" "What part?" and the seeking and finding of their fitting answers. By means of arithmetic as a way to think, in the degree we have learned the way, we (1) recognize number questions and (2) determine their answers.

Recognizing number questions and determining their answers are not separated thinking activities. They only appear so as we consider them separately and give them separate objective statements. Our knowledge of what the question is in a given instance suggests the answer we should seek and the way to find it. Conversely, our understanding and our mastery of the way to find answers give clues to questions which would otherwise be obscure, and make questions stand out from the qualities of situations which cover them. The number questions we recognize in situations are not recognized as objects which strike the senses or as objective facts which claim the attention. They inhere in the situations we confront, and are under the surface of things. They do not show themselves. We must uncover them if we are able.

Thus we have occasion to move along the way to think that is arithmetic only in the degree that we have learned the way. If we have learned the way sufficiently well, we can recognize number questions when they are hidden in the complexities of everyday activities and of personal and social situations. But if our learning is limited, we can recognize number questions only when they appear in the simpler and less complex situations that touch our lives. We encounter no more arithmetic in the affairs of our lives than our knowledge of arithmetic permits us and leads us to meet.

Our learning determines our attitude. The amount of our learning of arithmetic does not determine merely the extent of our opportunity to think about the numbers of things. It conditions, and often determines, the way we feel about the activities of number thinking.

If we can look under the surface of situations and discern number questions which call for answers, we find therein the stimulus and the drive for number thinking and the accompanying feeling of enthusiasm. On the other hand, if we confront but few and minor number questions, we have proportionately less enthusiasm for the business of number thinking. Besides, a little learning leads us into complacency.

When we cannot recognize number questions except in the simpler situations of the everyday, we do not realize that number questions exist elsewhere. As a consequence, we feel no need, and we have no need, for a better way to think in order to answer questions we do not meet. We feel no need, and we have no need, for any more arithmetic as a means of answering questions than the arithmetic we command brings such questions to light. The way to think that is arithmetic creates its own need. In a very real sense, we do not need it till we have it. This is the reason why our attempts to provide a need for arithmetic in advance of learning are largely futile. We do not put in front what follows in the rear. We do not make the trailer pull the car.

Number thinking and number language are in a common system. To aid us to think about the numbers of things in the way that is arithmetic—actually, to make it possible for us to think this way at all—we use number names and number signs, called *figures,* or *numerals.* The names designate and pin down our thoughts as we move along in our thinking. The signs represent and record our thoughts at each step of our thinking. They both do more than designate and represent a thought at each step. They, by the way we use them, guide our thinking toward succeeding steps.

Number names and number signs complement and supplement each other. The former constitute the oral language of our thinking and the latter the written language. They do not bear, each to the other, the false distinction which we sometimes contort them into providing—namely, that we use the oral language in "concrete" arithmetic, which we understand, and the written language in "abstract" arithmetic, which we do not understand. We encounter no distinctive concrete and abstract phases in our arithmetic as a way to think. Thinking in arithmetic is thinking, whether the questions we recognize and the ways of seeking answers we pursue are simple and easy or complex and difficult. In either case, the medium of our thinking is the language we use to designate and pin down our thoughts and to represent and record our thoughts. In our thinking, we use number names and number signs together and interchangeably. We may speak them and write them and do no thinking, but this is not the fault of either. On the other hand, the number thinking we can do without them is next to none.

We may speak the number names to indicate the figures we write or we may write the figures to record the names we speak, but this is only a minor use. Of itself, it is not thinking; hence, it is not strictly arithmetic. The real relation between the number names and the number signs is not a direct one, but an indirect one by way of the number ideas or the number thinking they express and record. Thus, each in its real use comes into relation with the other in the degree that both are a common medium of number thinking.

In our number thinking, we use single names and compounded names, and we use single signs and compounded signs. We use single names and signs for single number thoughts, or ideas. We use compounded names and signs for compounded thought, or ideas. We compound our single ideas, and our single names and signs, all according to a definite pattern. The pattern is the system. We use the system and rely on it to keep our thinking straight, to keep our ideas in order. Number names and number signs in a number system give us the vehicle to carry along our number thinking.

The system of our arithmetic is a decimal system. Number names do not designate merely our ideas of groups. They designate the objects or items in any given group as we study it to determine its size. Thus, as we count the objects of a group of five—*one, two, three, four, five*—each number name indicates and discriminates an object.

The names have an ordered sequence. Each has its place in a series. Each takes part of its connotation from those that precede it. The name *five* at once distinguishes the fifth object and includes it in a group with the ones already counted. As we utter the name *five,* we may point to the fifth object, but we also mean the group of five we have counted. Counting the group, one by one to five, gives us an idea of its size. The word *five* names the idea and pins it down.

Each number name designates its group. We use a single name for each group to ten, inclusive. Beyond ten, we use compounded names, each in its relation to the name *ten.* We use each compounded name to designate a compounded idea. When we count a group larger than ten, we break it down with our compounded names and re-group it in our counting and thinking into its relation to the group of ten. By derivation, the name *eleven* means "one and ten," and the name *twelve* means "two and ten." The meanings of the names *thirteen* to *nineteen* are obvious.

The name *twenty* was once *twain tens; thirty* means "three tens"; and so on to the compounded *ninety-nine*. Each of the single names, *hundred, thousand,* and *million,* represents a power of ten.

In our numeral system we have ten figures—nine numerals and zero. We write each numeral to represent a group as a single unity to nine, inclusive. We have no numeral for ten, yet we represent ten also as a single unity. We give ten a special treatment, and all groups beyond ten. To represent our idea of ten and our ideas of groups larger than ten we use both numerals and the positions in which we place them. Thus, to represent the single group of ten, one ten, we write 1 in ten's position. We write 0 in one's position to place and hold the numeral 1 in its proper position.

When we count a group larger than ten—eleven, for example—we use our final counting word, which is a compounded word, to designate our compounded ideas. *Eleven,* whether we so recognize it or not, means "one and ten." To record the idea, we write 1 to represent one, and 1 in ten's position to represent one ten: 11. Though the objects counted may actually belong together and be together in a single group, we do not think of the group, or name it, or represent it, as a single group. We think of it and name it and write it, broken down and re-grouped, as a ten and so many, or as so many tens. The actual single group is, for our thinking, what we name and write it:

Eleven, meaning "one and ten,"	11
Fifteen, meaning "five and ten,"	15
Twenty, meaning "two tens,"	20
Twenty-five, meaning "two tens and five,"	25

We say the number names in counting in ordered sequence, giving each a part of its meaning from all that precede. This is the system. We name our ideas of the sizes of groups to ten; beyond, we name them as *teens* and *tens*. This is the system. We write a numeral to represent each group to ten, but not including ten. We write a numeral in ten's position to represent a ten or tens to nine tens. We write zero, whenever needed, to hold empty position and to keep positions clear. This is the system. We write a numeral in hundred's place to show ten tens, or tens of tens. This is the system.

The number system is a decimal system, a system of tens.

Ten is the base, the center. All other ideas lead on toward ten or back to ten.

Algebra is a system of abstract processes. The processes of algebra are farther removed from concrete experiences than are the processes of arithmetic. Algebra does not deal with particular quantities, but with "any quantities." The symbols of algebra are especially appropriate for the purpose.

The letters of the alphabet in isolation mean nothing. They signify nothing except perhaps the sounds which are their counterparts. A given letter in isolation does not attach to any particular thing. We can in consequence easily attach it to anything we desire. In other words, because no strings of meaning attach to a letter, it is free for us to carry it to *any* meaning. Thus, with perfect ease, we can let a stand for any number, b for any other number, and so on. We then can deal with a and b without experiencing any particularizing restrictions to our thinking.

Algebra deals with the general laws of combination. Algebra relates to arithmetic; it depends on arithmetic; it is a step up the scale of abstraction beyond arithmetic. In arithmetic, we combine particular quantities. In algebra, we study the general laws of combining which apply to any and to all quantities. Both are thought processes, or systems of thought processes. Both are mental developments. Both are subjective, not objective. It is highly superficial to characterize arithmetic as a system of "figures," and algebra as a system of "letters." Figures and letters both are the objective features that give objective expression to subjective mental processes. It is not the figures and letters that are matters of fundamental importance in arithmetic and algebra, but the methods of thinking which they express.

The beginnings of algebra are not in the letters to whose use the pupil is introduced at the beginning of the formal course in the subject. The beginnings trace back to the pupil's recognition of the general and universal application of procedures which he learns in the study of particular combinations. In his arithmetic he learns that he can add a particular set of numbers in either direction—up the column or down the column—and the answer will be the same. He notes this fact in connection with a few additions—five added to four and four added to five, and so on. When he has the idea that he can add any set and all sets of numbers in either direction, he has discovered a general law. This general law is algebra.

When the pupil first learns to multiply, he observes that three fives and five threes bring the same answer. He observes the same products in the case of other similar pairs. He at first observes that he may interchange the multiplier and multiplicand in the case of particular pairs of combinations. Later, when he gains the idea that the interchange holds in the case of any pair of combinations, he has discovered a general law. This general law is algebra.

In the algebra class the pupil learns to state the general laws: $a + b = b + a$; $ab = ba$. His statements help to make him conscious of the laws and to fix them in mind. They help him to use the general laws in his thinking with more certainty because they give him a convenient means of handling the laws. Yet the statements, without the ideas of the laws they express, are meaningless. The pupil's algebra is his ideas of general laws, not his mere ability to state them with letters and signs.

The algebra the pupil learns develops in his mind. What he learns to write is the language of algebra. The language helps him to state briefly and explicitly the laws of combination, to center attention upon what might otherwise remain vaguely in mind, and to hold the laws in mind in convenient form for purposes of comparison. Without the understanding of the general laws which gives meaning to their algebraic expression, the language is nothing more than meaningless letters in meaningless arrangements. The rule which would not permit the pupil to write that which he did not understand is not without merit. The pupil who does not understand what he is doing gets no value from his course in algebra.

Pupils need help to understand the laws of algebra. The teacher should help his pupils to understand the rules of the algebraic system. The meanings of algebraic expressions do not show in their appearance. In consequence, pupils are inclined to conclude that no meanings are actually present. They find it easy to accept the algebraic expressions on the authority of the textbook and teacher, and to make a respectable showing in class recitation. They soon learn that they can deal with the expression of a rule without understanding it.

To help the pupil, the teacher must show him how to draw upon what he already knows. To illustrate, we shall suppose that the pupil has as an item for study the expression:

$$a\ (b—c) = ab—ac$$

In his work in arithmetic the pupil has had problems like the following: "A grocer bought 30 dozen eggs at 37¢ a dozen and sold them at 43¢ a dozen. How much did he make?" The usual procedure of the pupil in the sixth grade is to multiply 37 by 30, and 43 by 30, and to subtract the first product from the second. In this procedure are three steps and considerable chance for oversight and error. His teacher may show the easier procedure of subtracting 37 from 43 and multiplying this difference by 30. Now in similar problems, the pupil of the sixth grade is inclined to use the procedure he learned last. He fails to notice the relation between the two methods of solution except in the particular problems in which he has to use the two methods. He does not quickly gain the idea that both methods of solution give the same answers in all problems of this particular type.

The pupil finds in algebra the statement, $a(b—c) = ab—ac$, of the general law of dealing with the type of problem in question. The statement may bring the general law explicitly to his attention, especially if the teacher suggests how the two connect. The pupil now can extend his use of the general law and of its statement beyond the particular type of problem which originates and cements the connection.

Rule-of-thumb methods ultimately break down. In summary we may say that the learning of algebra is much the same as the learning of a language. One may learn the form and not the meaning. Or he may learn both and see no relation between the two. Or he may learn the form as an instrument which develops, shapes, relates, and expresses meaning. This is real learning of language. Outwardly this learning has about the same appearance as the two types of pseudo learning. Inwardly it so far transcends the other two as to make comparison of no importance, if not impossible. The attitude of the student who is really learning algebra is quite unlike the attitude of the student who is learning the forms of algebraic expression divorced from the meanings they are intended to express.

The student who learns the expressions of algebra without acquiring the meanings may for a time make a good impression.

He observes the rules of combination. He produces correct answers. He remembers the sequence of statements, the order in which one follows the other. His accomplishment may impress him as well as his teacher. He likes his "good" showing in class and is satisfied with his ability to adjust to and follow the routine. Yet ultimately he is disillusioned. Sooner or later he confronts the requirement to put together certain expressions whose union depends on a union of meanings he does not possess. At this point he fails and his failure is obvious. Actually his failure existed from the beginning, though he may not have recognized it. Now he knows that he fails, and he finds nothing in the barren form he has learned that gives hope of success. His rule-of-thumb methods have deserted him in the emergency. His "algebra," the so-called algebra he has learned, is without meaning and without value.

Summary. Arithmetic and algebra are systems of abstractions—not collections of ideas in isolation, but organizations in which each part helps sustain the whole. To characterize the systems, our discussions have developed the following points:

1. Arithmetic is a method of thinking.
2. Our learning determines our attitude.
3. Number thinking and number language are in a common system.
4. The system of our arithmetic is a decimal system.
5. Algebra is a system of abstract processes.
6. Algebra deals with the general laws of combination.
7. Pupils need help to understand the laws of algebra.
8. Rule-of-thumb methods ultimately break down.

Chapter 16

Drawing Conclusions

Purpose of the chapter. The gaining of experiences and the organizing of experiences are coordinate themes of preceding chapters. Our earlier discussions have treated the various aspects of these common themes from different points of view. The discussions have suggested that the activities of extending and systematizing experiences are not mere incidents in the passing situations of life, but instead are planned exercises which we may guide and control. In terms of the subject of the present chapter, we may say that a person need not "jump to conclusions." Instead, he had better keep his conclusions in suspense until he can seek and find sufficient meanings to make them reasonably adequate and consistent. Thus we approach the special theme of our chapter, which is the activity of drawing conclusions as a deliberate and thoughtful enterprise.

Conclusions begin with the application of experiences. The attitude which accompanies experience, which indeed is the characteristic element of experience, is not lost when the experience ends. If the same situation which provided the experience recurs, the residual attitude gives it a coloring it did not have at the first encounter. The added coloring aids in inducing the original response. Thus, the tendency of a person is to respond to a given situation as he has responded to it formerly. Among living organisms this tendency is universal.

A person carries the attitude that comes from any given situation to situations that are similar, or that appear to be similar, or that have similar elements, or that have a similar general pattern. This is to say, he learns by experience. A child who learns the name *chair* for something "to sit on" applies the name, both correctly and incorrectly, to other objects which he finds are "to sit on." A pupil learns to respond "Yes, Ma'am" and "No, Ma'am" to his teacher. He frequently gives the same responses to the male principal or supervisor.

The phrase "learning by experience" has much more meaning than appears in our statement and illustrations. Original experiences may produce the learning of a person. Subsequent experiences may enlarge and correct his learning. Thus, the child who applies the name *chair* to a couch discovers from new experience that he misapplies the name. New experience which provides the correction impresses quite as much as did earlier ones which gave the original meaning. The pupil who responds to the male principal with "Yes, Ma'am" and "No, Ma'am" learns in the course of experience how to make distinctions in his manner of responding to different persons. The experiences which produce distinctions are of themselves quite impressive. Learning by experience is both the development of a tendency to respond in a given way and the subsequent correction or re-direction of the tendency.

We need not mistake the child's tendency to give the name *chair* to everything he may sit on—a tendency which a psychologist has called "the primitive tendency of indiscriminate application"—for the process of drawing conclusions, though the primitive tendency is the basis of the mature process. The tendency, as regards any particular application, manifests itself when later experiences give a similar appearance to original ones. A conclusion, on the other hand, comes with and at the end of an experience, and before the opportunity for its application appears. The former is not a matter of deliberation; the latter is the result of thought. The former must wait for its manifestation until the opportunity comes; the latter anticipates the opportunity by constructing it briefly and seizing it in imagination. The former is automatic; the latter is planned in advance of its application.

Conclusions are often premature. All conclusions are not planned in advance with equal degrees of thought. Often they are formulated with only a minimum of thinking out of meanings that are much too meager. The adult will notice a given mannerism, or peculiarity, or act of behavior, in a new acquaintance. On the basis of this single item, he will conclude that here is a friendship to cultivate or a personality to avoid. The pupil will notice the objective element in the responses the teacher calls for. The pupil will conclude that he must memorize the words of the desired responses and recite them verbatim. The teacher does not need to urge: "What do you think about this?" "What is your conclusion about so and so?" In all probability the pupil has his conclusion already at hand, and had drawn it long before he had sufficient meanings to provide a valid one. The concern of the teacher is not so much one of drawing the expression of a conclusion out of the pupil as it is one of providing an abundance of meaning to serve as an adequate basis for a conclusion. In learning about the rectangle, for example, the pupil is apt to jump at once to the conclusion: "Always multiply the length by the breadth." This conclusion is often premature, for when the pupil has an example that asks for the perimeter of a rectangle, he seeks to find it by multiplying length by breadth. The good teacher seeks to forestall premature conclusions by providing a long series of experiences which gives an adequate basis for correct conclusions. When he teaches the rectangle, he goes to considerable lengths to call attention both to all the various features of the rectangle and to the method of measurement that is appropriate. He postpones the work dealing with a conclusion about the rule of the rectangle until the pupil has come to the end of the long series of experiences.

Conclusions are summaries of experiences. When any given situation, or series of situations, has called forth a given type of response a sufficient number of times, the response moves to the center of attention. The response—that is, how one has been responding—becomes the stimulating situation. To it he gives response, generally the response of language. Language describes the response, and the use of language gives it a fixity it did not originally possess. How the person has been responding now has a new force. Heretofore, it has waited upon the situation which called it forth. Now, it constructs in advance the situation, or situations, to which it seems appropriately to belong.

A person's attending to the way he has been responding halts his learning, whatever it may be. He stops his step-by-step learning to review what he has already learned, whether he provides the review or another provides it for him. In any case, the review is a recall of past experiences, of past meanings. It may be a new view, or an enlarged view. A phase in the learning of multiplication in the primary grades will serve as an illustration.

The pupil finds the answer to two times three, and by the same method to three times two; to three times four, then to four times three; and so on. At the outset, he works each multiplication by itself, and then he works its "opposite" in the pair. He notices common products, but he notices them as common for particular pairs: first one, then another, and so on. Now, in the course of his work, he reviews what he has learned. In his review, he learns no new multiplications, but merely recalls what he has already learned. Let us suppose that his teacher guides his attention especially to the sameness of products in each of the pairs he now recalls, and encourages him to discuss and describe this fact of sameness. Sooner or later, the pupil concludes that this sameness belongs not only to the pairs he has learned, but also to any he may be expected to learn. Though he does not develop in full the algebraic law that applies, he nevertheless formulates a workable conclusion out of the meanings he has in his possession. Use of the conclusion in later work serves to impress it. Thus, in the pupil's later work, once he has found the answer to four times five, he determines the answer to five times four, not by the same method, but through the application of his conclusion.

A conclusion summarizes experiences and brings them to a head in a statement. The statement gives them an impressiveness they did not have before. It gives their possible application a singleness of direction. A conclusion is a kind of summary of experiences.

Out of the description that has just been given come two questions: Whose experiences? Whose summary? Answers to these questions appear next in order.

Direct experiences are impressive, but narrow and inadequate. An answer we may give to the question, "Whose experiences?" is that the experiences may be one's own. Such experiences are excellent for purposes of summarization. They are personal, and they are impressive. The old adage "There is no substitute for experience" carries the suggestion that for impressiveness nothing can take the place of personal experience. The beginning teacher, for example, finds himself at a loss in attacking the problems of instructing his pupils because he lacks experience. He gets his work under way with more confidence and success the second year because of the experience of the first. The student in courses in education learns from his few hours of training in practice teaching much that had hitherto escaped him. His experience in practice teaching often provides extra meaning for matters he had already learned in his other course work.

On the other hand, personal experiences are necessarily limited. However numerous they may be, they constitute a contact only in a small sector of a whole field. They are narrow and superficial, and they cost much both in time and energy. "Experience is a dear teacher" means that the school of experience sells its instruction at costly rates. As a consequence, personal experiences of themselves do not provide sufficient materials for systematic organization and summary.

Indirect experiences may be broad, but they lack vividness. Another answer that should be given to the question, "Whose experiences?" is that the experiences to be summarized should include those of other persons. The experiences of other persons are of course second hand. As such, they do not have the same appeal as firsthand ones. They do not impress themselves upon the attention as do one's personal experiences. They lack the vividness which is the chief characteristic of direct experiences.

On the other hand, the experiences of others can be broad. They are not expensive. They require comparatively little time and energy to secure. While a person is gaining a single direct experience at great expense, he can profit from many experiences of other persons. Though he is able to see only a small section of the world through his own eyes, he may get a broad view through the eyes of others. Earlier chapters have called attention to the possibilities of extending experience through imagination, which is a way of adding to one's limited and narrow experiences the numerous and wide experiences of others. It is only through indirect, imagined experiences that a person can learn anything adequately and systematically in any field. The history of any science, or of any body of information or ideas, or of any method of thinking or of attack upon everyday situations that is productive in our complex world, reveals a long course of slow, intermittent, and minute accretions from the direct experiences of the race. The individual, to be prepared to take his place in the modern world, must be trained to stand on the shoulders of those who have preceded him. He must learn what they learned, but in a shorter time; and, if possible, he must learn more. But to do this he must learn by other than direct methods. Life is too short for anyone to undertake the task of discovering science, or systematic bodies of ideas, or methods of thinking, out of his own direct experiences.

Adequate summaries require an appropriate balance of both direct and indirect experiences. Then each kind can supplement the other, can make up what the other lacks. For breadth, the summaries should deal with the numerous and varied experiences of others; for vividness, they should include adequate personal experience. To illustrate, the student of education needs to carry courses which provide both kinds of experiences. He needs the courses which supply him with the varied experiences of many teachers at work in different types of schools. He needs also the courses in practice teaching to supply the impressiveness which is lacking in the indirect experiences. Neither type can stand very well alone. The former by itself is unimpressive; the latter by itself is far too narrow.

A summary adds vividness to the summarized experiences. The experiences which go together into a summary are those having similar features, or certain elements, in common. In other words, the meanings which are combined must have the shapes that enable them to fit together. As a consequence, a summarization focuses attention upon the features which seem similar or the elements which seem to be common. When a person takes time to summarize, he does more than merely recall the experiences, direct and indirect, which he has acquired. He gives them a closer scrutiny, or an examination from a somewhat different angle, than he gave them at the time of their acquisition.

Thus, a summary tends to bring out meanings that would otherwise remain hidden below the surface. Suppose the student of education has been reading about the experiences of several teachers of science in making laboratory demonstrations before their classes and has reached the conclusion that to be successful the demonstration must follow a discussion of what the observer should look for and of what the demonstration may reveal. Later, he may reread the experiences or otherwise review them in order to notice how closely the demonstrations followed the steps of procedure which the introductory discussions suggested. Because he looks for this element of relationship between introduction and demonstration, he finds it standing out in clearer perspective than it did at the beginning. Now, he may go so far as to revise his original opinions, such as they were, of the recorded experiences. He is at least more impressed by their values and deficiencies.

A summary is a factor in later experiences. Let us now follow this student of education into his own classroom when he becomes a teacher of science. He has in mind the routine of making certain demonstrations before his own classes. He also has in mind the conclusion relative to preliminary preparation, such as the foregoing paragraph indicated. This conclusion helps to shape his conduct of his classes. His method of introducing the demonstration is more than a mere matter of routine, more than simply something else to do. The conclusion determines his attitude, the responses he looks for from his students, and the way he adjusts the introductory discussion to secure the responses he feels he should get. His new experience as a teacher is shaped and colored by the conclusion which he brings to it.

A summary of experiences is not all to the good. It reacts negatively as well as positively. Coming as a conclusion of a series of experiences, it sometimes serves as an end of thinking. It becomes the ready-made response to subsequent situations of a similar nature, and often to others that differ in many respects. It thereby tends to prevent subsequent situations from furnishing new accretions of meaning, and to color them so that they seem to lead to meanings which actually they do not justify. It may bring to an end a person's education along the particular line on which it originally had a bearing. This is one of the reasons why long experience often is a disadvantage. A person draws his conclusions and tends to let them stand in the road of new adjustments and new acquisitions of meanings. It should be said that to keep his thinking up to date, a person should constantly be engaged in re-summarizing experiences and in making new and different summaries.

Students should study methods of drawing conclusions. It is a common human tendency to jump to conclusions, to summarize experiences before there are enough experiences at hand to justify a summary. Many of these conclusions change under the correction of subsequent experience. Many remain much as they were originally, coloring later experience in misleading ways. Such conclusions are worse than none. To avoid them, students should have training in drawing conclusions.

One item of the training is suspending judgment. Training in suspending judgment is quite at variance with the common tendency to jump to a conclusion. It is in fact so much the opposite of the inclinations of students that they do not accomplish it at all except as their assignments definitely provide it. To illustrate, let us return to our earlier account of the way the teacher may guide the pupil to study the rectangle. In our account, the pupil had no incentive to jump at once to the conclusion, "multiply the length by the breadth." Instead, the pupil had many things to do and to work out before he had an opportunity to come to a conclusion. He·had to study and to distinguish the kinds of angles which characterize the rectangle. He had to construct several different angles as a means of impressing the distinctions. He had to follow in imagination the steps of procedure a person must take when he measures anything. He had to note the distinguishing features of the unit of square measure. He had to apply the unit directly in the actual (noncomputational) measurement of several rectangles. Finally, he came to the conclusion which was his own solution of the problem of the rectangle.

Another item in the student's training is a study of the ways of drawing conclusions by people who have learned to suspend judgment while they seek information to check a tentative conclusion. The study, analysis, and discussion of some of the great experiments in science are excellent for the purpose. In every story of an important experiment there is enough of personal attitude, of the thrill of search, of anticipation of success, of disappointment with early results, and of final exaltation upon discovery, to command attention and to hold interest. There is ample opportunity in the discussions for the teacher to lay stress upon the slow and tedious development of the conclusion, the reserving of judgment while search for more data was under way, the drawing of tentative conclusions, and the checking and rechecking of results. Thus, before the immature has learned to suspend his own judgment, he may learn something about the suspending of judgment by contemplating the experiences of others. Upon the point that one may learn from the methods that have been pursued by others, more will be said in the next chapter.

Textbooks are encyclopedias of summaries. To this point we have canvassed the answers to the question, "Whose experiences?" We now come to the question, "Whose summaries?" To this latter question there can be for any given individual only one answer, "His own."

A summary of experiences has to be one's own, else it does not exist for him. It is his only as he makes it for himself. He may possess the meanings to summarize, and to these he may add the summary of another, or, to be exact, the statement of the summary of another. Now it appears that he possesses a summary. Actually, he lacks the meaning a real summary carries, because he can gain this meaning only through the activity of combining meanings. This is only another way of saying that a person's mental labor he must perform for himself.

At this point the question arises, "Of what value then is the summary another has made?" The question is especially pressing when we consider that for students the chief stimulus to learning is the textbook, and that the textbook is an encyclopedia of summaries. We face the question, "Of what service to the student are the author's summaries in the textbook?" They are excellent summaries, no doubt. They carry much meaning for the author, because it was the author who deposited in them his meanings. But to the student who reads them they are only statements of summaries, not actual carriers of meanings.

The answer to the question must be in terms of the use the student makes, or is taught to make, of his textbook. In the main, he may study his textbook for one or the other of two purposes: (1) to acquire the statements of summaries; (2) to acquire suggestions for the making of summaries of his own.

Students may seek statements of summaries. The statements in textbooks are usually well and impressively made. They attract attention to themselves. They seem to the reader to be the last word, the conclusion of thinking, the culmination of intellectual effort. As statements, they can hardly be improved upon, certainly not by the immature student who reads them. He may employ the subterfuge his teacher unwittingly suggests of giving the statements "in his own words." Generally, such an attempt results in poor substitutes. The student had better let the statements alone, and he frequently knows it.

Because of the impressiveness of the statements in his text, the student is more often than not satisfied merely to acquire them until the recitation period, the quiz period, or the final examination. Many he retains; most he forgets. He would probably be just as well off if he should forget them all. His learning activity is verbatim memorizing, the pseudo learning of verbalism.

Students may seek suggestions for the making of summaries. On the other hand, there is much of value in the statement of the author's summary. The summary may be much more than a sonorous flow of impressive words. It may be the arouser of reactions of meaning. The acquisition of the statement of another's summary may be the prelude to some summarization of one's own. It may arouse the impulse to imitate. The student may say to himself, "Here are some experiences, largely indirect perhaps, which the author describes. Here is the way he fitted them together. Here is his summary. I, the reader, may make a summary of my own."

The reader of the textbook is not a mature summarizer of the kinds of experiences described in his texts and reference books. He needs guidance. He needs a pattern to follow. The summaries of the text give the needed guidance and pattern. What the student can do—occasionally on his own volition, but usually only when he is required by his teacher—is the important thing. He can acquire the second-hand experiences of his textbook. He can combine these with some of his own direct experience, if he has had any that is appropriate. He can follow the pattern laid down in his text and fit the experiences all together into his own summary. He may find parts of the author's statement suitable for his own summary. For other phases of it he may have to provide his own statement. But following the pattern in the textbook, he may produce a summary of experience that is his own. This is the summary, the only summary, that has significance for him, for into it he has deposited the meanings which are his own and into it he has combined his meanings into new ones. These new ones are also his by right of personal discovery and invention. For such activity, the student's textbook is an invaluable aid. Its statements stimulate, set a pattern, and give guidance.

With his own summary in hand the student can return to that of the textbook and find within it much of meaning, such meaning as his own intellectual efforts have provided. He may find in the summary in the text elements which are in contrast with some in his own statement. At this point, he becomes a critical evaluator of summaries, both of his own and of that in the text. At this point, his own summary ceases to be the conclusion of his thinking. Instead, it becomes a tentative conclusion, a stepping-stone to another that may be more valid. At this point, the student learns something about the suspension of judgment. He learns it impressively through his own direct experience, for he holds his judgment in suspense, not because he is told that that is the correct thing to do, but because his conflict of meanings serves as the motivating force to bring it about.

Textbooks may be used to acquire summaries, which is deadening, or they may be used to acquire patterns for the making of one's own summaries, which is stimulating. There are many suggestions in current educational literature that textbooks should be largely abandoned because they stultify intellectual effort. It is not the textbooks we should condemn, and we do not remedy the situation by throwing away a valuable tool. The remedy is a revision of the use students make of textbooks. Let them be set at the task of looking into textbooks for the patterns which may guide their own intellectual endeavors. While students are immature they need the guidance of maturity. Even when they become mature, they may still learn from the efforts of others.

Summary. The discussions of the present chapter have described the drawing of conclusions as the summarization of experiences. To this description two questions have been appended: "Whose experiences?" "Whose summary?" In the development of the description and of the answers to the two questions the following points have been made:

1. Conclusions begin with the application of experiences.
2. Conclusions are often premature.
3. Conclusions are summaries of experiences.

4. Direct experiences are impressive, but narrow and inadequate.
5. Indirect experiences may be broad, but they lack vividness.
6. A summary adds vividness to the summarized experiences.
7. A summary is a factor in later experiences.
8. Students should study methods of drawing conclusions.
9. Textbooks are encyclopedias of summaries.
10. Students may seek statements of summaries.
11. Students may seek suggestions for the making of summaries.

Chapter 17

Learning Methods of Thinking

Purpose of the chapter. The present chapter will continue the discussions which the preceding chapter introduced. From a consideration of the procedure of combining experiences into a summary, we shall move to a consideration of the procedures of anticipating a summary in advance of the experiences which appear to justify it, and of selecting such justifying experiences as the summary seems to demand. We shall consider somewhat explicitly the responsibility of the school to give training to pupils in the systematic methods of thinking they should learn to employ. The discussions of the present chapter will center in two main topics—namely, (1) learning how to study, and (2) the study of problem-solving.

1. Learning How to Study

The study habits of pupils are usually accidental. The study habits of pupils are good or poor, depending upon the accidents of circumstances over which the school has no control. With few exceptions, they are good in the case of those pupils who come from homes which provide a place and a time and an incentive for study, and give some suggestions about the values and the methods of study. With few exceptions, they are poor in the case of those pupils who must make their own opportunities for study at home, and who receive at home no directions about methods, or, at best, directions that are inconsistent and sporadic. It would be fair to state that quite generally the school has not as yet gone seriously into the business of providing systematic training in methods of study.

There are several reasons for this state of affairs. One reason is that teachers generally are more interested in *what* the pupil learns than they are in *how* he learns. The classroom activities they conduct, the examinations they give, and the standards for advancement they impose indicate that this is true. Another reason is that the method of the recitation concerns them more than does the pupil's method of preparing for the recitation. The pupil's recitation, his discussion, his questions, and his answers intrigue the teacher; and generally so much that the pupil finds it out and learns to study his teacher better than he learns to study his subject. Still another reason is that teachers are trained to be more interested in methods of teaching than in methods of learning. Many of the courses they carry in training are courses in how the teacher should instruct rather than in how the pupil should be expected to learn. The total result is that teachers know very little about the actual learning activities of pupils. They are unprepared to give pupils helpful guidance in methods of study when they discover that their unbalanced interest in content, in recitation, and in methods of teaching leads to failure. They are especially susceptible to the notion that each pupil's method of study must be his own and that he should by experimentation discover his own method.

Though the pupil's method of study may be individualistic, its individualistic quality does not necessarily make it successful. There are more unsuccessful ways of studying than successful ways. The pupil, when left to himself, may by accident fall into a method that will prove to be successful. There is a greater possibility that the method he adopts in this manner will be unsuccessful.

Failures in school usually trace back to poor study habits. It is generally clear to students and teachers alike that failures result from poor ways of studying. The pupil is unwilling to apply himself. He is interested in other things. He is unable to attend as he should to the task at hand. He becomes confused because he does not know how to relate the details of what he does acquire. He does not have, or does not provide for himself, adequate opportunity for study. In short, through a combination of reasons, he does not apply himself sufficiently well to the lessons which he is expected to prepare. Failing students in high school and college, when interviewed, assign to poor study habits or to poor reading ability the major reason for failure. The observations of their teachers confirm their judgment.

Method of study is more fundamental than content. When the teacher turns his attention to the possible ways he may help his failing students, he makes three important discoveries. He discovers that the cultivation of good habits of study is more important than the mere acquisition of content. He discovers that the cultivation of good habits of study gives special value and meaning to the content thereby gained which it would otherwise never have. He discovers opening before him a choice which he can make between two possible procedures—namely, (1) the procedure of teaching the subject directly to the pupil, and (2) the procedure of teaching the subject more or less indirectly by teaching the pupil methods of study and methods of work. Many teachers do not realize that they have a choice. They follow the first of the two procedures willy-nilly. Others weigh the merits of one procedure against the merits of the other and thus prepare themselves to make an intelligent choice.

At this point it is proper to inquire, "What difference does it make which procedure the pupil follows so long as he learns the subject?" One answer is that when the first procedure is successful it does not lead to learning the pupil can use and extend to best advantage. Another answer is that there are always concomitant results in learning which are of great significance. Consideration of the latter answer serves to clarify and establish the former.

In the learning of a subject, whether it is learning in activities, skills, information, ideas, or methods of thinking, the pupil always gains certain acquisitions which do not show up objectively in the tests of achievement. One of the most important of these is the attitude of reliance, or habit of reliance, which develops as a kind of by-product. In learning the subject, the pupil at the same time learns either to rely upon his teacher for what he learns or to rely upon himself. In the one case, he is a dependent learner;

in the other, he is an independent learner. In the one case, his learning may stop when he leaves school and the instruction of his teacher; in the other, his learning may continue because he continues as a pupil in the school of self-instruction.

Following the direct method, the teacher teaches the subject directly to the pupil. Though the pupil may learn the subject, he does not learn it to best advantage, because he learns to rely upon the explanations and the meanings which the teacher provides. Since no teacher is perfect in the explanations he provides or in gauging exactly the meanings the pupil needs and when he needs them, the instruction is not entirely suited to the developing needs of the pupil. Following the indirect, or partially indirect, method, the teacher teaches the pupil how to work out things for himself. At the same time, to be sure, he teaches the pupil much of the subject, but he does this largely as a means to the end of making clear to the pupil the methods of work he should use. Then, as the pupil learns the methods of work, he goes to work using the methods to teach the subject to himself. The pupil may learn less of the subject; indeed, at the outset he learns much less than he might if the teacher taught the subject and nothing else. But the pupil learns—very slowly, to be sure—to teach himself, to make clear to himself what he learns. He learns through this indirect method, properly pursued and properly followed up, to become his own teacher. Though he may be a poor teacher of someone else, he is, when he learns how, his own best teacher.

Pupils may learn independent methods from the primary grades on. Even in the primary grades the pupil may be an independent worker part of the time, and derive satisfaction as well as profit from his independent work. For example, in learning the thirty-six simple additions whose sums are eleven to eighteen, instead of learning each as his teacher may present it, the pupil may learn how to put the addends involved in each addition to make a teen—that is, ten and so many more. As the pupil gains the idea of the method, he becomes equipped to work out answers to the thirty-six additions for himself. Such work moves along much more slowly than the mere telling and explaining of the additions by the teacher. Nevertheless, the pupil accomplishes more than the learning of answers. He understands the answers as he works them out. He notices relations which would otherwise escape him. He builds up some self-reliance, some self-assurance, some dependence upon his own developing ability to understand. In short, as he learns to use a method of work to teach himself the arithmetic the teacher assigns, he develops an attitude that is favorable for further learning.

For further illustration, we may turn to the class in literature in the high school. Here the teacher has chosen certain selections—poems, essays, and the like—which are slightly above the level of the everyday reading activities of the students, but not so difficult as to be beyond their reach. Instead of teaching these selections by explanation, illustration, and otherwise, the teacher undertakes to teach the ways the students may read and study the selections to best advantage. Each selection provides the occasion for emphasizing the method the teacher desires to teach, which is, let us suppose, the three-fold one of (1) rapid reading to get a bird's-eye view of the whole selection, (2) analytical study of details, and (3) a synthesis of details in a final appreciational reading. The teacher explains each step in turn, illustrates how the students should take it, and sets them to work taking the steps for themselves. As the students so engage themselves, the teacher gives help and suggestions when and where needed. He tries to adjust each step to the requirements of the selection. Thus, if the poem is a short one, he may have the students proceed with the three steps in a single class period: ten to fifteen minutes to get a view of the poem as a whole; fifteen to twenty minutes to work out the meanings of certain words, phrases, and allusions; and the rest of the period to make a final reading. Or, if the selection is a longer poem or an essay, the students may need two or three class periods for the first step, a week for the second, and two or three days for the third. In each case the teacher undertakes to set the manner of acquiring the content, as well as the content, at the center of attention. In each case the teacher gives explicit directions about proceeding with each of the three steps of the method of study. As the students move ahead from one selection to another they find the content varying, but the method of study remaining the same. Before long they become conscious of the method, and acquire some degree of skill and independence in the use of the method. In this manner they succeed not only in learning literature, but also in learning how to read literature. To their developing interest in literature there is added a developing personal attitude of satisfaction which grows out of their developing ability to read literature.

Faulty practices in reading may be corrected. Poor study habits and poor reading habits are closely related. Often they are one and the same. Many pupils at all levels of the school meet difficulties in the preparation of their assignments through the sheer inability to read and interpret the descriptions, directions, illustrations, and explanations in their textbooks. All too frequently this inability results in discouragement and eventual failure. Teachers are becoming increasingly aware that the failing student is more than likely a poor reader and that the first step of the instructional program required is the step of teaching him how to read his new book. They are discovering that in many instances the instruction in reading at the earlier levels has not been thorough, and that even when the earlier reading work has seemed to be successful, faulty and ineffective readers have moved along to the later grades. As a result, many high schools have undertaken programs which are designed, first, to locate the poor readers and determine the causes of their difficulties, and, second, to provide remedial instruction for the faulty practices that are uncovered.

Students exhibit many types of reading faults and difficulties. Some are poor in recognizing printed words. Some possess very meager and inaccurate vocabularies of meanings. Some read words as words and not as symbols of ideas. Some do not phrase properly, do not interpret the words they read as belonging together in meaningful phrases. Some are not aware of key words in sentences and do not distinguish the topic sentences in paragraphs. Some read each paragraph as though it were wholly unrelated to every other paragraph. Some are habitually slow. Some do not look into the paragraphs they read to find answers to questions.

Whatever the fault of the student, so long as it is purely a reading fault and not organic, such as poor vision or word-blindness, an instructional remedy is at the teacher's hand to use. Once both teacher and student locate the fault and the student becomes aware of the possibility of a remedy, it only remains for the teacher to determine the deficiency in the student's earlier instruction which allowed the fault to develop and to supply the instruction which has been lacking. Students can learn how to attack printed words, how to look for the meanings the words suggest, how to phrase, how to distinguish key words and sentences, how to organize, how to speed up their reading, and how to read with some purpose. No well-planned program of remedial instruction in reading has ever been reported as having failed to justify the energy required to carry it through.

Students may become conscious of different levels of reading activity. Those students who can read material of ordinary difficulty independently, and those who are approaching independence through the removal of defects and faulty practices, can become aware of the real difference between the rapid reading of a story and the assimilative reading of their textbooks. They already recognize a difference in the difficulty of the reading materials. The one type they classify as easy, and the other as difficult. They may notice that the real difference is one of purpose, one that resides in the reader quite as much as in the reading material. In the one case, the reading is efficient to the extent that the reader follows the thought of the writer; in the other, the reading is efficient to the extent that the reader follows his own thinking.

Assimilative reading is undertaken and guided by the reader's purpose to answer a question, to solve a problem, to acquire needed information of a particular kind. His purpose dominates his reading, and makes it critical, selective, discriminating reading. He skims the phases of the content which do not meet his purpose, however interesting and important they might otherwise be. He gives special attention to the phases which seem to meet his purpose. His purpose is the vital element in his reading.

Students may learn effective ways of engaging in assimilative reading: how to judge materials in terms of purpose, how to skim, how to concentrate, how to organize. The instruction of effective assimilative reading takes its point of departure from the reader's purpose. Accordingly, the initial stage of such instruction is a drawing out, an elaboration, and a clarification of purpose. As a consequence, consciousness of the character of assimilative reading is proportional to consciousness of purpose.

An earlier topic has dealt with the teaching of a method of appreciational reading. There it was indicated that awareness of method was the goal of instruction. Such awareness makes this form of reading activity distinct from ordinary reading.

Raising the level of reading activity calls for the cooperation of many teachers. Just as the guided practice of the student in the extensive reading of good materials of ordinary difficulty requires the services of teachers who have a wide knowledge of such materials, so does instruction in the higher levels of reading require the services of teachers who are acquainted with the fields which supply appropriate materials. The content subjects—the physical and social sciences, for example—make available for students questions to answer, problems to solve, and topics to prepare, and the appropriate answers, solutions, and information as well. Similarly, mathematics provides the materials which the student must read analytically, and literature the materials which he must read appreciatively. Moreover, each teacher of whatever subject is legitimately concerned with the student's method of study. Each then for the sake of his own subject in particular may properly be a teacher of reading. Each may teach the type of reading the materials of his subject require and thus make his contribution to the all-round general education of the student.

Summary. Every class may properly be a class in methods of reading and study. Though at first glance this situation may appear to be one which subordinates the special discipline each subject is intended to provide, it nevertheless in the long run emphasizes the special discipline. As the student learns to teach himself, to rely upon methods which he can use, to depend more and more upon his own developing ability to work things out for himself, he gains the ability not only to learn more than it would be possible for another to teach him, but also to learn to better effect. The matter has been developed under the following main points:

1. The study habits of pupils are usually accidental.
2. Failures in school usually trace back to poor study habits.
3. Method of study is more fundamental than content.
4. Pupils may learn independent methods from the primary grades on.
5. Faulty practices in reading may be corrected.
6. Students may become conscious of different levels of reading activity.
7. Raising the level of reading activity calls for the cooperation of many teachers.

2. The Study of Problem-Solving

Problem-solving is a deliberate, complex mental activity. A problem is a question involving doubt. It is the involved doubt that makes a question into a problem. A problem is also a difficulty. Also its answer is not known. But the essence of a problem does not lie in its difficulty or in the ignorance of its answer. We may not know how many students are in the school auditorium, and we may require time and effort to find the number. Yet such a question is not a problem. Though we may not know the answer, we do know how to find the answer. When we find the answer, we are certain that it is correct. To the child who has not learned to count or who is as yet uncertain about the little counting he can do, such a question is a problem. Ignorance about how to find the answer or uncertainty about the answer when found are the elements in a question that make it a problem. In consequence, we may say that not all questions are problems. Or we may say that the factor that makes the problem is not located in the question, but in ourselves.

Problem-solving is something more than getting an answer to a question. It is a kind of double procedure. We must be certain about the method to use to find the answer. We must be sure that the answer we find is the correct answer. These statements imply that the problem-solver must attend to the doubt itself, and to the information he needs to remove it. When he is distracted from the doubt to be resolved, he is thrown off the whole process of removing it through the substitution of certainty. Problem-solving is a deliberate and complex mental activity. The attitude of problem-solving is the attitude of substituting certainty for doubt.

Students have decisions to make, not problems to solve. The student in the class in mathematics who is certain of his answer merely because he relies upon the assurance he gains from his teacher and his textbook does not have the solution of a problem. The reason is that the certainty he thus secures does not substitute for doubt. This type of student has no doubt to start with; hence, no problem; hence, finally, no solution. The passenger in a bus on a strange road is certain that he is moving toward his destination. His certainty comes from his reliance upon the driver. He has no doubt about the way the bus will turn at the next fork of the road. The trusting passenger has no problem. When the driver makes the proper turn, it is not the passenger's solution.

Problem-solving requires a choice between two or more possibilities. It also requires the necessity and responsibility of making a choice. The bus passenger, for example, feels no responsibility for making a choice at the fork of the road. If he were driving his own car over the unfamiliar road, the situation would be different. Then, as he approached the forked road, he would have to resolve a doubt. Yet, even there, he would not engage in the activity of problem-solving to any appreciable extent, for he would know what to do. He would inquire at the nearby filling station, or consult his road map, or look up and down the road to note the road markers. The student in school has many such decisions to make. Shall he elect chemistry or physics? Shall he join the debating club or the radio club? How shall he obtain the money to pay his club dues? Does he impress his teacher if he asks questions in class? He must and he does make decisions, but in so doing he indulges in little problem-solving, if any at all. The reason is that much of the doubt in the situations which confront him has already been removed. His parent shows a preference for chemistry; his close friends are in the radio club; he must wait until his allowance is due or until he accumulates enough profit from his paper route; he tries out some questions to discover how his teacher will respond.

The grasp of issues taxes the abilities of immature students. Problem-solving requires more than choice. It must start with an issue that presses, and a grasp of the issue. The doubt, the point of departure of problem-solving, is the conflict in the mind between items of information which do not seem to agree. One set of facts impels action in one direction, and another set impels action in a different direction. How to organize the two or more sets of facts into a consistent scheme is the problem. For example, what is the value of a person's house for purposes of taxation? Is its value the original cost of building it? Or the cost to replace it today? Or the amount it would bring at a forced sale? Or what the owner would be willing to receive for it? Or the amount a neighbor would be willing to pay for it? Much more than these questions is involved in the total issue, but the total issue does not confront the usual property owner. His only issue is that of the method of insisting that his property be assessed no higher proportionately than are the other properties in his block. A person does not grasp the real issue of property valuation until he has accumulated in a systematic way information on all the matters indicated above and on dozens of other related ones in addition. The student in school may not be expected to grasp the real issue nearly so well as will the expert in taxation.

At this point the question may arise: "Why not set the student at problem-solving when he has grasped an issue somewhat imperfectly, but as well as his limited knowledge permits him?" The answer is that the solution of a problem never rises above a person's grasp of the issue, and the resolving of a doubt never transcends the quality of the doubt. It is true that students in the social science class may consider and debate the issue of property assessment, but their discussion may deal with only that narrow sector of the total issue with which they have become familiar. Such consideration and debate are no doubt justified if they are merely the preliminary to a further study of the real issue. They provide a change from the usual round of class routine. They give questions for which the students may feel impelled to find answers. They stimulate interest in further study. Why not, then, let these activities run along to a solution which the students can develop? The answer is that the solution they are capable of developing provides a certainty of an imperfect and questionable kind. Just as doubt stimulates interest, certainty satisfies it. The student leaves such activities not only with an imperfectly conceived solution, but also with his mind closed to the necessity for further study. Such activities give practice in problem-solving, but practice only on a level that is slightly higher than the student could reach if he never came to school.

There are many real issues which confront the intelligent citizen. For these he does not have complete and satisfactory solutions. This is the reason why they are issues, and why as an intelligent citizen he continues to be interested in them. Immature students are not equipped to provide the solutions. They are not able to comprehend all the issues. But some they can begin to grasp as they acquire information upon them. It will tax their energies and abilities to gain and to organize the information which reveals a few of the issues confronting responsible citizens.

To study problems, detachment is necessary. Teachers frequently consider and often follow the suggestion that they should bring to the attention of students those issues which affect directly the immediate activities and interests of the students at home, in their neighborhood, and in school. The agencies of taxation assess the properties of their parents; the neighborhood is concerned about the location of a new school building; and their teachers assign lessons which they must prepare. These matters are problems in the purview of the daily lives of the students. They are directly at hand, and available for close personal attention. Let the students get their training for the later study of problems by studying the problems which surround them.

There are two answers to the suggestion in addition to the answer which our foregoing discussion has anticipated. One answer is that immediate personal problems are like direct personal experiences. They are impressive, but narrow. If the student spends his time with personal problems, he does not have a proper chance to get a broad view of the world in which he lives. Moreover, unless he can view personal problems in the perspective of a broad view of the world, he can see them only in distortion. A distorted view is not merely an inadequate view; it is also an imperfect and misleading one.

Imperfect and misleading views suggest our second answer. That is, immediate personal problems show themselves behind the veil of personal prejudice. Prejudice wields a tremendous influence in the affairs of men. Each property owner views assessment in the light of what his own taxes will be. He views the location of the neighborhood school in terms of personal convenience and the effects upon the values of adjacent properties. The student views the assignments of the teacher in terms of the way they fit in with the activities which the student has planned for himself. The student is not sufficiently detached from the problems mentioned to give them proper study. They are not problems to him because he feels little responsibility for making a decision regarding them and he has no doubts regarding what their solutions should be. His prejudices, or those of his parents and neighbors, give the answers to the first two suggested problems; and his narrow view of the school holds within it no routine or program other than the ones to which he is accustomed.

The subjects of the school present problems detached from personal interests and emotional distortions. As objects for the study of immature students, the problems which the school subjects present are superior to the problems of the students' immediate surroundings. In the first place, the problems presented by the school subjects are carefully described from the various angles which more mature students have found to be significant. They are set off in the clear perspective of the surroundings which give them the character they have. The various pertinent facts which color them have been accumulated and placed ready at hand. They may be seen in their relations with other problems which through comparison suggest their relative importance.

In the second place, the problems which the school subjects present are superior because they have been selected for their simplicity. Not all the problems which belong in a subject are advanced upon the student's attention. Only those within the limits of his ability to grasp have been selected. As a consequence, the student does not face certain defeat in his effort to comprehend problems that are too difficult for him. That is to say, the problems do not overwhelm him with complexities and conflicting interests which are too compelling for him to resolve. In addition, the problems do not relate to the personal interests, feelings, and prejudices of the student. This is the major element of their simplicity. They lack vividness, it is true. They do not force their way into the field of the student's attention. To get acquainted with them, he must actively and with conscious effort seek to take hold of them. But their own characteristics, when apprehended, determine the student's interpretation of what they are like. Predetermined attitudes that arise from considerations which have no relation to the problems need not affect the student's interpretation.

Problems in the school subjects appear in various stages of development. Still another advantage attaches to the problems which the school subjects present. The problems appear in various forms and with varying degrees of doubt to give them character. Some appear with the doubts which were in them at the outset entirely removed. That is, they appear as solved problems. Some appear with their doubts partially or temporarily removed. Others appear clothed in more or less complete uncertainty. The several types of problems are in the topics which make up the sciences and the social studies in the curriculum of the student.

In arithmetic, there are numerous problems. Each has its complete and certain solution. These are questions which at one time involved doubt. Now they involve no doubt, except, of course, to the failing student. Now they are no longer actual problems. For example, how to divide a large group into a given number of smaller equal groups was once a problem. The peoples of ancient and medieval times had no certain way of finding answers to division questions. The "problem of pursuit," or the rate-time-distance problem, is a classic illustration of an actual problem of early times. An army had a certain distance to march; it could march so far in a day; how many days would be required to reach the destination? How to weigh and measure accurately is another illustration. Certain things had "poundage," or were "goods of weight," or they were "so big." How much they weighed and how big they were early peoples could tell only in crude comparisons which left them in uncertainty.

In the natural sciences, problems which are difficult to define and to grasp appear with much of their doubts removed. The relation between the volume of a gas at a given temperature and the pressure upon it is a solved problem. The cause of malaria is no longer a mystery. In the subject of history, there are problems of society which the peoples of earlier days met and solved. The student can study the solutions as well as the problems. The solutions and the methods of getting them suggest critical inspection. In many instances, the solutions have been proved by subsequent events to be partial or temporary or incorrect ones. In the social studies in the later grades, there are many problems which have not had their doubts removed. Public support of education, taxation, national defense, conservation, poverty, crime, and a host of others are loaded with doubt. For such problems as these society has developed no complete or satisfactory solutions. They must be studied as unsolved problems. They are particularly appropriate for the study of uncertainty, for there is little about them but uncertainty for anyone to study.

Problem-solving may retard the student's development. The requirement to attempt the solution of problems seriously slows the progress of the student. Problem-solving is a slow and laborious procedure. Solving problems from the beginning of the course keeps him from moving along toward the final stages of the course. It prevents him from becoming acquainted with more complex and up-to-date problems. The problems which the immature student may be able to solve are the simple problems which were solved by individuals long ago. Their known solutions are an important phase of the content of the course, especially at the beginning. They constitute the foundations of the later stages.

The requirement of problem-solving makes it necessary to keep the student in ignorance of the foundational elements of his course in order that he may be unimpeded in his efforts to discover and construct them for himself. No good teacher of science has the conviction that the immature student should be left to rediscover science. No good teacher exerts himself to keep the student in ignorance of the foundations of his subject. The real teacher tries to throw as much light as he can upon all phases of the subject. The real teacher aids the student to grasp the problem, to see what it now is and once was, to follow step by step the effective method of solution that long ago was worked out for it, and to understand the solution and what it leads toward. The real teacher removes from the course, or postpones for later study, only those elements and phases which his experience indicates are too difficult for the student to attack and to apprehend.

At this point, we should recall that in the social studies there are many unsolved problems. These are real problems. There are no solutions to hide, because the solutions are undiscovered. Why not let the student solve some of these problems, and thus acquire training in problem-solving? The answer is that if the student were able to solve these problems, he would not be an immature student of the school, but a public benefactor.

The student in school is so immature that he can easily convince himself of his ability to attack and solve the problems of society. The overenthusiastic teacher may easily lead him to the production of "solutions." The student's experience and training and information are all so meager that the doubts in the actual problem are not known to him or are at best only minor, insignificant doubts. With his lack of understanding of related issues and of the far-reaching implications of the real problem, he "solves" the "problem." He may even "check" his "solution" by drawing a parallel between his narrow view at one end of the procedure and his comparably narrow view at the other end. The result is a "jumped to" conclusion, a prejudgment, a "solution" which satisfies the student. The final result is an opinionated individual with curiosity sated and with a mind closed to further study and investigation. Problem-solving of this sort is an insidious form of pseudo learning.

Direct experience provides vividness. There is need for a reasonable amount of direct experience in the solutions of problems which are within the ability of the student to solve. From time to time the study of problems, of how they have been solved, and of their solutions, needs to be interrupted so that the student may be set at the task of solving or trying to solve a simple problem for himself. This activity teaches a lesson he needs to learn. The lesson is that the solving of problems is a slow, careful, and labored process; that it is fraught with difficulties, confusions, and discouragements; and that it is never so easy as the descriptions make it appear. Only by personal experience can the student learn this lesson. His major studies need a vividness which they of themselves do not contribute. The student must seek the needed vividness where he can find it. When he gains this vividness, he can carry it forward to his major studies to aid in making them impressive. Direct experience in problem-solving is a means to an end. When the end—namely, vividness—is gained, direct experience should give way to those ends which give breadth.

Understanding methods of solution is the goal. The immaturity of the student in school need not prevent him from developing a working acquaintance with problem-solving. Though in the main his attempt to solve problems would be wasted effort and would lead to a superficial view of the true nature of the process, he can profit by studying the process as others have developed it. That is to say, his learning about problem-solving need not be postponed until he is equipped to engage effectively in the process.

For illustration, we may turn to the teaching of a process, dividing in elementary arithmetic. The process of dividing is a perfected solution of what in earlier times was the practical problem of separating a large group into a given number of equal groups or into equal groups of a given size. At one time, as we have mentioned, the process was a question involving doubt, but now the doubt has been resolved. In teaching dividing, the teacher's first effort is to make clear the question which the pupils must answer. Next, instead of leaving the pupils to flounder in confusion while they hunt aimlessly for a way to get the answer, the teacher makes clear the systematic and exact procedure of getting the answer. Now the pupils divide, as the teacher's question and as the answer they should seek require. From their dividing they get the meaning of dividing. On the teacher's part, there is no desire that the pupil will be doubtful about any phase of the process. Thus, the teacher presents dividing not as a problem, not as a doubt, but rather as a simple, step-by-step procedure of finding the certain reliable answer to a known question. The good teacher makes certain that the pupil knows how to take each step of the process before he attempts to introduce the succeeding step.

Method is more important than mere content. In a school subject there are two related elements—content and method. One is a means; the other is an end. One is of passing value; the other is of permanent value. For immediate purposes and uses, content is of major importance. The content gives substance to the method. It clothes the framework of method and makes the method clear. But content, being thus of immediate value, is of passing value. Like yesterday's newspaper, it is out-of-date. Yet content, though old and outmoded, may still be most valuable as the materials of method. As such, it makes the method show up. It puts the method on display, and attracts attention to method. It is method which has continued usefulness. When the student gains the method in a subject, as an end or outgrowth of the content which gives it substance, he gains a means of giving form and structure and added usefulness to any new content which he may learn.

In the different subjects, content and method exist in different proportionate amounts and with different proportionate values. Chemistry and geometry, for example, have content and method. The content of chemistry is of considerable obvious value; it is attractive; it requires much energy to deal with it. The content of geometry has in comparison little value. It has very little obvious value to most students. It is not of itself very attractive, and it requires little energy to deal with it. It is this lack of value and attractiveness of the content of geometry which is its cardinal advantage as a subject for study. The student may devote the major portion of his energy to the study of method. In chemistry, he does not have this opportunity; he must devote the major portion of his energy to the handling of the content.

Notwithstanding the difficulty of dealing with the method of chemistry, the student must study and learn it, else his progress is soon halted. There is in the subject so much of content as to lead to confusion unless the student quickly masters the systematic methods which have been perfected for dealing with the content. Moreover, it is the method of the science which is its essence, the *idea* of use which directs the use to which the content, or any part of it, may be put.

The method of geometry is the method of checking solutions. The method of problem-solving is the method (1) of guessing the answer from the available data, and (2) of testing the guessed answer to determine its worth. If the guessed answer proves to resolve the doubt, it solves the problem. If it proves to be inadequate, another guess must be tried. Much depends upon the method of testing the guessed answers.

A person's attitude toward his guessed solution of a problem and the method of testing he employs are closely interrelated. Thus, if his guess is plausible, he is inclined to assume that it is tested and to accept the guess as the solution. That is to say, if his guess removes his doubt, he no longer has a problem to solve. His guess is his solution, right or wrong, insofar as his thinking goes. It remains a solution to him, until at some later time the hard facts of actual experience rudely crowd new doubts upon him.

There is a broader and better relation between guessing and testing. When a person has a given method of testing guessed answers and is in the habit of applying the method, he will retain a doubt relative to his guess until he has subjected it successfully to his test. Thus, his doubt about his guess before the test, and his certainty, should his guess meet the test, are in proportion to the rigidity of his test. The whole matter may be summarized in the statement that the method of testing a person has at hand, and is inclined to use, has much to do with the way he senses a problem to be solved as well as the way he checks his guessed answers.

It seems to follow that training in a method of checking is at one and the same time training in the grasp of problems and in the general procedure of solving them. Thus, let us say, the teacher of geometry makes clear the nature of proof and the method of using proof, and gives his students practice in using the method as a check of various answers to various kinds of questions. As a result, his students learn much about the sensing of problems in various kinds of situations. Among other things, they learn to notice and to distinguish beneath the surface of situations the contradictory elements which give them uncertainty. Their training in the process which may seem to come at the end of the procedure of problem-solving carries back to the attitude which motivates the beginning of the procedure.

The subject of geometry has a content—namely, space—which gives it substance. Geometry has also its characteristic method, the method of proof. This is what the student must study, if he studies geometry. If he studies space alone, or chiefly, he misses the essence of the subject. In geometry, the student has an opportunity to learn a way to check answers, whether certain or guessed, true or false. In geometry, he does not study the whole of the process of problem-solving—only its conclusion. In geometry, he begins with the answer and studies its proof. The method of geometry is the method of checking solutions.

In everyday affairs proof is more important as a standard than as a tool. In the hands of the individual who can use it, proof is a valuable instrument. Its chief use is that of checking the solutions of problems. As such, it is a standard of measurement and of comparison. It is less a tool to use to gain a desired result. It is more like a pattern and less like a procedure.

Yet when we think of proof, we tend to think of it as a process to be used. To learn the nature of proof, we had to learn its ordered steps, and the way to move through the ordered steps to the "proof" of a proposition we knew in advance. Thus, we tend to think of proof as a process of "getting something across" to another. We consider it a means of handling something which we already have in mind so that we can make it acceptable to another. We regard it as a language to enforce conviction. Thus, the student uses proof to demonstrate a proposition. The lawyer uses proof to convince the jury. The salesman uses proof to advance the merits of his wares. The editor uses proof to establish a point of view. The conversationalist uses proof to stimulate belief. Almost always we think of proof as a weapon of offense—a legitimate weapon, perhaps—one which gives its possessor an advantage. As a consequence, we are frequently inclined to question its value.

Regarding the conception of proof as a device for forensic attack, we may raise a number of questions. Does not proof have a very limited usefulness? Is it not merely the tool of a specialist? The lawyer, the salesman, and the editor may need proof in their callings, but does the common man? Surely the common man—the one in callings other than those just indicated—does not need a course of training that will enable him to advance propositions of various sorts with a view to enforcing them upon others. Is not a course in the nature of proof a phase of special education for a few special callings, not of general education for all?

Proof is much more than a weapon of offense. It is first and foremost an arm of defense. First of all, it is a means of defense against our own hasty solutions of problems. If we have at hand a conception of what proof is, we are prepared to evaluate our guessed solutions to problems. We evaluate them according to the way they square with the standard of proof with which we compare them. Proof is also a defense against the arguments and propositions which impinge upon us on every hand. We do not have to serve on a jury to come into contact with proof or with what appears to be proof. The sales agent, the editor, the magazine writer, the candidate for office, the political speaker—all confront the common man with propositions and with what they advance as the "proof" thereof. If he has at hand a conception of what proof is, he is prepared to evaluate all such "proofs" according to the way they square with the standard of proof he applies to them. Certain of the "proofs" square with his standard. He can accept these with confidence. Certain of the "proofs" do not square with his standard. These he can reject. If it is true that the advocate needs training in proof, it is equally true that the judge needs such training. In the complex social world in which we live, few are advocates, but all are judges.

Summary. Problems are questions involving doubt. The solution of problems is the process of removing the doubt from situations. The character of the process is determined by the quality of the doubt. It is important, therefore, that students learn to sense the doubts which exist in the situations of life. Since the removal of doubt may be superficial rather than complete, it is also important that students become acquainted with orderly methods of solution. The subjects of the school reveal problems in the various stages of solution, including the final stage, which is that of checking solutions once they have been reached. The discussions develop the following main points:

1. Problem-solving is a deliberate, complex mental activity.
2. Students have decisions to make, not problems to solve.
3. The grasp of issues taxes the abilities of immature students.
4. To study problems, detachment is necessary.
5. The subjects of the school present problems detached from personal interests and emotional distortion.
6. Problems in the school subjects appear in various stages of development.
7. Problem-solving may retard the student's development.
8. Direct experience provides vividness.
9. Understanding methods of solution is the goal.
10. Method is more important than mere content.
11. The method of geometry is the method of checking solutions.
12. In everyday affairs proof is more important as a standard than as a tool.

Chapter 18

Acquiring Appreciations

Purpose of the chapter. Accompanying the successful performance of a task is the joy of successful performance, the satisfaction in work well done, the pride of achievement. This feeling is frequently the experience of the pupil in the school. When, after much effort, he acquires a given skill, or learns a method of thinking which he can use with confidence, or works through a particularly difficult exercise to the desired answer, or gains an insight which hitherto has been denied him, the pupil experiences a peculiar satisfaction. He is proud of his success. He has the joy of triumphant endeavor. He is thrilled with the value which his accomplishment means to him. In his enthusiasm he wishes to give a personal demonstration to his parents or to other sympathetic auditors: "I learned to read about Jack and Jill today. Listen to me read." "I can add up to nine plus nine. Let me show you how I can add."

The thrill of the pupil's earlier achievement often is no more than a pleasant memory to him when he comes to take up the tasks and responsibilities of maturity. In the school, his tasks and responsibilities had been planned and shaped for him; in the school, his assignments had seldom been too difficult to perform. But in the adult world of affairs, he all too frequently finds his tasks and responsibilities so formidable that he can deal with them with no more than indifferent success. Even as he moves up through the school, his thrill of satisfaction in achievement diminishes. He grows critical of the results of his efforts, and he becomes less and less inclined to give them a high value. It seems to be the lot of the common man to find in what he can accomplish less and less which gives him the pride of performance.

But if the common man in the very nature of circumstances is to be denied a realization of value in his own performance, he is not thereby prevented from seeking and realizing values in the works of others. He can still recognize what stands for him as perfection, and from the perfected performance of others he can obtain a vicarious thrill. Thus, from the disturbances of his work he seeks escape at the close of the day in the successful developments of fiction or in the ordered sound of music. And thus, he looks into the tangled skein of nature, seeking and sometimes finding perfect patterns of form and of color, and of blends of light and shade.

The purpose of the present chapter is to consider how a person may come to realizations of values which transcend those of his ordinary activities and of the everyday practical affairs of his life. The purpose is to consider the nature of appreciations and the service they render in giving satisfaction to the individual. What appreciations are, how they are acquired, the process of appreciation, and kindred topics will be the subjects under discussion. The appreciation of art, not its production, is the central theme.

Art is an inner experience. For the purposes of our present discussions art is distinguished from nature and from the objects which give expression to art. Art is internal and subjective, not external and objective; art exists in the inner world of the individual who possesses it, not in the outer world of objects which impinge upon his senses. Art and beauty are synonymous; art is beauty and beauty is art, and each exists only in the degree a person conceives it.

Though we speak of the beauties of nature and of sensing the beautiful in natural objects, we speak thus with a certain reservation of mind. Such beauties as we seem to sense in nature are there only as we conceive them; others may miss them entirely or may seem to sense quite different beauties. That is to say, we observe beauty according to the way we observe, not according to what we observe. We must distinguish beauty, else we lose it. Really, considering the matter in this fashion, there is no beauty to observe. Beauty—art—is not an attribute of nature, but an attribute of the individual who has learned to discriminate it in nature.

To many persons, mountain scenery is the epitome of beauty; yet mountains offered no beauty to behold until art created it and made it a thing of the mind. Until the Renaissance, artists included mountain scenery in none of their works, for to them mountains had no beauty. Mountains were places to be shunned, barriers to traffic, forbidding, and with dangers lurking in their shadows. Finally, Giotto and others began to substitute somewhat obscure mountain views for the customary gold backgrounds of their pictures. These depicted views then became objects of attention. People looked at them, and then they looked at mountains. They saw in mountains what was now in their minds. They saw in mountains what before had not been there to see.

The artist can give expression to his art; others cannot. The possession of art as an inner experience is different from the outward expression of art. It is not the poet only who possesses poetry; or the musician, music; or the dramatist, drama; or, in short, the artist only who is the possessor of art. There are many who experience beauty in the world around them, but are wholly unable to give their experience tangible expression. The artist differs from these individuals in two respects. He can give expression to his inner experience, and he can develop and refine his inner experience through expression.

An artist is a technician. Through long training and practice he has become the master of a technique which others may admire, though they may not understand it. Yet his technique is not a distinct development; it is not unrelated to his artistic sense. Or we may say, the artist is more than a mere technician. His employment is not the mere expression, however perfect, of what he sees and hears. He is not a copyist. He expresses that which is within his experience. Thus, he does not reproduce a landscape, but, instead, the beauty he has caught from his view of the landscape; he does not tell a story, but, rather, the feelings which the story has aroused in him. In other words, he makes his technique the handmaiden of his art. As the artist developed his technical skill, he had to give close attention to the phases of beauty he was trying to express. By so doing, he has learned to recognize elements of beauty which completely escape the ordinary individual. Thus, the craftsmanship of the artist serves the double purpose of a means of expressing his art and of a stimulus in developing his art.

Appreciations are perceptions of intrinsic worth. Appreciation is a phase of perception. The discussions of the nature and development of perception in earlier chapters apply in a special way to the nature and development of appreciation. We perceive according to the patterns of perception we have developed. Similarly, we appreciate according to patterns we have acquired. All perception is not, of course, appreciation; only the perception of art, of beauty, is appreciation. We appreciate according to special kinds or forms of patterns, patterns into which we have learned to fit only certain classes of stimulations from the external world. Appreciation is not the same as perception in general, or ordinary perception.

The chief distinction between appreciations and ordinary perceptions is in their contrasting purposes, in the different ends which they serve. The former are ends in themselves; the latter are means to ends. We construct the former for their own sake primarily. We construct the latter because they are, or seem to be, matters of necessity.

The perception of words in reading, for example, is not an activity in and for itself alone. It is, rather, an activity which is intimately related to the purpose of apprehending meanings. The reader scans the page to find the ideas the page may reveal. His perception as he reads transcends the mere recognition of printed words. He reads in search of meanings. He reads to find answers to questions, or to find information on matters that concern him. He examines words to gain the ideas they suggest. His recognition of words expands into his perception of ideas.

On the other hand, much of a person's reading may be leisure reading. A person reads a story to gratify his curiosity about where the author may lead him, or he reads a poem for the pleasure it may give. In leisure reading, he feels at the time no external purpose to be met. His perception of meanings is an end which justifies itself. Though he may acquire meanings which may have a valuable use later, his activity of acquiring them is at the moment a matter entirely of present enjoyment. In leisure reading, he is not keyed up to get a required amount of work done. He may at times engage in vigorous mental activity, but the vigor of his activity escapes him, because he gives his full attention to the meanings as he gains them. Leisure reading is a kind of release from activity —from the activity which necessity drives—for it is undertaken as a matter of importance in its own right.

We may state the matter in another way. A person does not engage from a sense of duty in appreciating literature, or music, or graphic art, or drama, or a sunset, or a mountain view. The presence of a sense of duty is a distraction which converts what otherwise would be appreciations into perceptual experiences for remote or external ends. When a person "does" an art gallery, or climbs a mountain to view the sunrise, under the drive of the idea that here is a worthy task he should do for his own good, he certainly is not engaging in the activity of appreciating. Nor does he, so long as he has this extrinsic motive. Should he, however, lose sight of the motive, even for a space, in the contemplation of what he sees, or hears, or feels, during that space of time he appreciates. Only those perceptions which are valuable in themselves alone are appreciations. Perceptions which are valued for the uses they may have are not appreciations. Appreciations may be thought of as analogous with friendships. If one cultivates a friendship with a person for the value of the friendship, or for the uses he can make of the friendship, or for the favors and advantages of the friendship, he is not cultivating a friendship that is mutual. The friendship is one-sided, and the existing side does not belong to the one who possesses the ulterior motive. As friendship is divorced from self-interest, so is appreciation dissociated from the ends it may be made to serve. As friendship, if and whenever gained, justifies itself in its own intrinsic merit, so does appreciation make itself important in its own values.

Appreciations are ideals of perfection. Appreciations, then, are creations of a person's attitude. In what he perceives, he sees enough of value to keep him from being diverted to anything else at the moment. Nothing else at the moment is quite as important as the appreciation he is experiencing. The appreciation is so complete in its own intrinsic worth as to need nothing to add to its value.

As an appreciator of art, the ordinary individual secures a sort of vicarious satisfaction from the production of the artist. To him, the work of art seems a perfect blend of color, of light and shade, of form, or a perfect blend of sound, or of meaning. It represents what he would wish to produce if he but had the requisite technical skill. It is an imagined production of his own, and a model of perfection when compared with the imperfections of his own actual labors. For example, a person may have running through his mind a vague melody, which he feels the urge to produce. Yet, without training, he cannot produce it. Any attempt to whistle it, or hum it, serves merely to destroy it. Let him now, or at some later time, hear the melody. Though it may be somewhat imperfectly produced, it seems, when conceived in terms of his own inadequacies, to be a perfect production.

Appreciations are expectations resulting from experience. In the course of experience, the individual encounters certain colors, shapes, tones, melodies, and the like, which are pleasurable. The blue of the sky, the red of the sunset, the green of the woods in spring, the pattern of a tapestry, the symmetry and balance of a building, the clear note of a bird, the roar of a waterfall—all seem to strike a responsive chord. In the very sights and sounds themselves are enjoyments which are largely, if not purely, sensory.

Similarly, in the course of experience, the individual encounters various combinations of color, of line, of sound, and so on, which also are pleasing. They may, as is commonly said, rest the eyes or sooth the nerves. Frequently, in connection with such experience, the individual hears a description of how certain colors match in pleasing combinations of hues, values, and intensities; or of how certain lines and shades combine into a symmetrical design; or of how certain tones combine into a melody. Occasionally, he makes his own description of the combination. Now, when the actual experience is over, the description remains as a kind of *idea* of what is beautiful, or, by contrast, an *idea* of what is not. Any such idea may help or hinder the development of appreciation.

A person brings to new experiences his idea of what is beautiful and what is not; and he looks and listens to note the representation of his idea. For example, he looks in early spring to notice the green of the early budding tree, and because he looks, he is more apt than otherwise to discover such a tree in the midst of a wood. He looks for a certain type of balance in a building, or he listens for a certain combination of tones in a musical selection. Because he looks and listens, he distinguishes what might otherwise escape his notice. Conversely, because he looks and listens for certain combinations, he frequently misses others which are equally valuable and equally pronounced.

We look and we listen for what we expect to see and to hear. We have an object for our looking and listening before we see the object or hear its sound. In short, we look and listen with a certain degree of expectancy, with a feeling of what we are going to see and hear before the sight or the sound is present to the senses. Our past experiences have combined into certain expectations of things we may see and hear and in other ways sense.

Appreciation is the gratification of expectations. The influence of expectation as the conscious counterpart of habit upon subsequent experience has been a topic in earlier chapters. In a given social situation, for example, we expect to find the type of behavior that suits the occasion. At the ball game, we expect one kind; at the church service, we expect another. If, in the given situation, things turn out according to expectation, we have a feeling of satisfaction, a feeling that all has gone well. If, on the other hand, the behavior differs from what we expect it to be, we experience a shock, a disturbance, a feeling of disapproval.

Similarly, a person appreciates, or he does not, according to his expectations. The individual who has lived among the hills of the Appalachians experiences a feeling of pleasure in his first view of the hills of a New England landscape. He is not at once at home among the wide stretches of the plains, which somehow seem desolate and barren. Conversely, the resident of the prairies feels shut in and restricted when he visits a region that is mountainous. If it is a person's expectation that a picture should show action to tell a story, he fails to secure gratification in a landscape or portrait. If his expectation is merely that of rhythm, he may be bored by a symphony. But if his expectations are different, if he looks for blends of color and light and shade and for combinations of sound and tone and melody, he is not satisfied with a picture of action in the one case or with swing music in the other. He approves what he sees and hears in works of art when they meet and gratify his expectations. He values them—that is, appreciates them—according to the standard of his expectations. He appreciates what he recognizes of the things he looks to see or listens to hear.

Appreciation requires previous training. Expectations are the products not only of chance experiences, but also of organized experiences. They may develop through training. In other words, a person may be trained in ways of appreciation.

Training in appreciation is training in what to look for or to listen for. It is the building of expectations of what may be present to be seen or to be heard.

The reading program of the school illustrates the fact that appreciation requires previous training. Students who have mastered the art of reading ordinary material independently and with ease are able to profit from instruction in appreciational reading of literary materials. Students who are poor readers of material of ordinary difficulty, who are slow and laborious readers and inexact and inexpert readers, do not profit from the teacher's suggestions relative to the procedures of appreciational reading. It is true that the poor readers may learn a good deal about what to "look for" in poetry and in other types of good literature, but they are able to give attention to these expectations only when someone else reads the literature to them. To be able to give attention to such expectations when they do the reading themselves, they need, first of all, to have mastered the art of ordinary reading, and, secondly, to have had guidance and practice in the art of reading the literary materials which are a step or two beyond what is the usual and the ordinary for them.

Good taste is usually the result of training. Good taste is seldom accidental; usually, it is the product of training. Again, the reading program of the school provides an illustration. When the school has provided its pupils with a working mastery of the art of reading, it either leaves the development of reading tastes to chance or seeks to develop tastes for that which is good in literature. In the one case, there is no planned program of guidance in reading. As a result, the pupils read what they choose or what accidentally falls into their hands. They may develop the taste for good reading materials, or they may develop the taste for that which is questionable. The fact that so much that is questionable is published and sold attests to the widespread demand for such reading material. In the other case, the school not merely teaches pupils to read, but provides a place in the program for guidance in reading. It surrounds its pupils with abundant and well-selected reading materials. It introduces these materials to the pupils. It provides a suitable time during each school day for reading, a time when the reading is done, not for reports and discussions, but for the interest the reading activity provides. It stimulates the pupils to read. The purpose is to lead the pupils through reading into newer and larger interests. The result is that taste is not left to chance. Tastes for good reading develop through the reading of materials which are good.

In similar manner, many schools accept the responsibility of developing tastes for what is good in music and graphic art. What the pupils may see and hear out of school is, of course, beyond the control of the school. In school, however, there can be control and guidance, so for a time each day attention is directed to the beauty which may be seen and heard in artistic production if one but knows where and how to look and listen. In the classes in appreciation, which are becoming more and more numerous, pupils are given training in looking and listening.

Appreciation transcends the activity program. The process of appreciation is an internal activity, not one that is external. It occasionally leads to activity outside of and apart from itself, such as discussion, exposition, or other forms of expression. But the appreciation itself is an activity that is peculiarly self-contained; it is a recognition of value sufficient in and for itself.

Thus, when one is reading and enjoying—that is, appreciating—a poem, an essay, or a book, he is wholly wrapped up in the reading. He takes no thought of the possibility of a later discussion of what he may be reading. He is not concerned with the taking of notes for a book report. He does not think about how he may use what he is finding out in a recitation that is to follow. Indeed, when the school provides a place in its program for reading as a major activity of importance in its own right, it scrupulously avoids the imposition of any external distractions. At other times in the school day, it requires its pupils to read as a means to ends which are external to reading, or makes reading an incident to ends which are outside of and beyond reading. But during the period set aside for the development of good tastes through reading, reading is the central, the primary, and often the sole activity of the pupils. During this period, one may observe a room of thirty to forty pupils completely occupied with reading. Each pupil is reading a different book, each is absorbed in what he himself is reading, and each is apparently unaware of the presence of the teacher and of other pupils in the room. An inquisitive visitor would get little response from these pupils. There is no cooperative group activity, no "sharing" of one's reading with another. Each pupil is occupied with his reading and does not want to be disturbed.

Similarly, looking and listening are individual internal activities, not cooperative group activities. One does not "act" what he sees and hears. This would be inimical and disturbing to the looking and listening. To look and to listen one must "be still." If one has in mind, as a result of past experience and training, something to look for or to listen for, he wants the opportunity to be still in order that he may see or hear.

Summary. Appreciations are patterns and expectations of values which are the outgrowths of sensory experience. One may bring these patterns and expectations to bear upon new experiences as backgrounds and standards for the recognition of new values. When one appreciates, he gains values, values important enough in themselves at the time to justify whatever effort one may be putting forth to gain them. When one appreciates, he recognizes in whatever is present to the senses the art, the beauty, or the value which is within him.

The nature of appreciational patterns and how they are developed and used have been discussed under the following main points:

1. Art is an inner experience.
2. The artist can give expression to his art; others cannot.
3. Appreciations are perceptions of intrinsic worth.
4. Appreciations are ideals of perfection.
5. Appreciations are expectations resulting from experience.
6. Appreciation is the gratification of expectations.
7. Appreciation requires previous training.
8. Good taste is usually the result of training.
9. Appreciation transcends the activity program.

The task of the next chapters. The present chapter brings to a conclusion the second step in our presentation of the movement of pupils from untrained to trained responses and of the activities of the school in fostering and guiding the transition. The first step was one of description of behavior and mental states and processes in general. The second step has been one of analysis. The first step provided a broad view of mental activity as the learning situations of the school shape and condition it. The second step has shown details of the most important types of mental activity which the learning situations of the school initiate and foster. The purpose of the first step was to furnish a view of the forest. The purpose of the second step has been to examine, as it were, some of the various kinds of trees.

We are ready to take the third, and final, step in our presentation. This third step is one of synthesis. In this step we move back from our examination of the trees in order to secure a more comprehensive and appreciative view of the forest than was possible at the outset. Having moved in our studies from wholes to parts, we now move again to wholes.

Part IV *Conditions and Results*

Chapter 19

The Motivation of Learning

Purpose of the chapter. Many teachers believe that the motive of learning is the feeling of desire that comes from a sense of the value of learning. Pupils learn to read when they want to read. They develop an understanding of number when they want that understanding. They acquire appreciations when they want to have them. Pupils want to read because they sense the value of the information that comes from the printed page. They want to add because they have a use for adding in keeping scores in a game or in computing the costs of things. They want to appreciate music because they anticipate the pleasures this appreciation will bring. In the eyes of many teachers, their pupils are confirmed pragmatists. That is, learning becomes important to the pupils as it becomes related to something else.

Yet the facts in the case seem to deny this widely held view of the power that drives the machinery of learning. It is not the children who come to our schools who are pragmatists, but many of us who teach them. Through the long course of our experiences we have found that learning "works," that it has a practical usefulness. In consequence, we sometimes forget to be realists. Instead of taking our pupils as we find them, we estimate their inclinations and potentialities from our own mature points of view.

The activities of children are important to them. This is as true of the activities that arise and develop from the stimulation of external influences as it is of those they pursue through the dictates of their own whims. This is as true of their school activities as it is of those they practice outside of school. The activities, whatever their kind or stimulation, provide their own importance. Doing for the sake of doing seems the thing. In the activities is the motive force that sets them off and keeps them going. The activities of learning are no exception. They in a very special sense provide the power which drives them.

The present chapter deals with inherent motives. It emphasizes the motives that are inner qualities of the learning activities the school may set up and direct. The chapter describes motives of three types: (1) the motive of social imitation, (2) the motive of individual desires, and (3) the motive of external pressures.

1. The Motive of Social Imitation

Social imitation is a compelling motive. Social imitation is the most characteristic human trait and the one which sets off in sharpest distinction human behavior from animal behavior. Members of the animal kingdom are imitative. The tendency to "run with the pack" is common among them. Yet their imitative behavior does not provide the permanent results that are so notable in the case of members of the human family. Among the animals there are no social customs, no social standards, and no social arts such as man possesses and passes along through social imitation from one generation to the next.

Social imitation is a conservator of social institutions. It is also a basic requirement for development through individual variation. Through social imitation each younger generation learns to speak its mother tongue, to adopt the bodies of ideas and the modes of thinking of the older generation, and to pattern after the points of view, the manners, and the conventions which are a part of the social heritage. Through social imitation each younger generation takes over its inheritance of material and cultural capital. In consequence, each succeeding generation stands as it were on the shoulders of the preceding one. The new generation inherits, and it may add to its inheritance, the contributions which its genius makes possible.

The force of social imitation pervades all human activity. If man is the possessor of any one instinct, or of one instinct more than another, it is the instinct of adaptability. When a person addresses a child, he does not use the louder, gruffer tones with which he is accustomed to address an older person. He does not speak to the kitten as he does to the dog. His feeling and behavior respond to the atmosphere of the group of which he becomes a part. Obeying the conventions and following the styles consume the human energy. "Keeping up with the Joneses" is both a spur and a guide rein to human ambitions.

New situations influence reliance upon social patterns. The force of social imitation in human affairs is ever-present. It is especially apparent and influential in situations which are new and unusual. In these situations the ordinary patterns of response are not appropriate. A person must seek and set up new patterns. It is instructive for us to observe where the individual commonly turns for guidance in selecting the new responses which he feels he needs.

We often hear the suggestion that the situation which requires an out-of-the-ordinary response puts a person into the problem-solving frame of mind. This suggestion seems logical. We can easily rationalize it. Thus, let us say, in a new situation we do not know the appropriate response. We are frustrated. We have the sense of failure. We now, in the face of failure, canvass the demands of the situation and try to discover a response which seems to meet the demands. We may reason, then, that the initial effort to meet the new situation resulted in failure, that failure produced a problem, and that the problem stirred us to seek a solution.

If this is problem-solving, it is of the type in which pupils engage when they look for the answer in the back of the book. The truth is that the ordinary individual does not confront problems in this manner. There may exist in the new situation and in his failure to meet it all the elements of a problem. But he does not usually put them together to make a problem. Even when the elements seem to go together of their own accord to make a problem, the individual usually seems not to sense it or not to realize the necessity for solving it. The central fact in the matter is that the individual in modern life is not a Crusoe leading a solitary existence. He is instead a social creature in the midst of his fellow beings and surrounded by social influences. The new situation, though it may seem to belong to him individually, is of social origin. Accompanying the situation—indeed, a part of it—is a conventional response which also is of social origin and which society deems to be appropriate. The individual learns very early in his life to look to society for the responses to the situations with which society confronts him.

To illustrate, we may follow the adult who enters Grand Central Station for the first time intent upon taking a train to a given destination. To all appearances he is in the midst of confusion. He sees a huge number of people moving in all directions. He hears the announcement of the arrival and the departure of many trains. He does not know where to turn—that is, if he were to depend upon himself, he does not. Yet he does know where to turn. Society, which makes available the means of transportation he wishes to use, also provides the appropriate response and the means of making it known. The adult is not confused. He meets no failure. He knows where to turn for help. He looks until he locates the booth marked "Information," and to that he goes for guidance.

The child who pays his first visit to a large department store displays the same unerring social tendency of the adult traveler. The sights and sounds of the store capture his attention. They excite him, almost overwhelm him. He does not know his way around. Yet he does get around. The secret is his tight grip upon the hand of the older person who came with him. Left to himself, he would be lost. Yet at no time is he lost, for he relies upon the person who brought him in to take him safely out.

The traveler on an unfamiliar road consults his road map or the attendant at a filling station. The unacquainted guest observes the actions of those about him. Novel situations do not throw a person upon his own resources for the solution of his difficulties. Instead, they make him aware of his dependence upon society.

Young children turn to older persons for guidance and leadership. When the child of six enters school he comes into a situation that is new. He has new games to play, new things to do, and new friends to make. He must respect the privileges of other pupils who are equally bewildered by their new surroundings. He must do things on time. He must conform to an established and ordered routine. Even in the school that operates under a minimum of set program and routine, he must arrive on time, hang his wraps and keep his materials in order, and shape his actions with some regard for his classmates. He must concern himself with demands upon his attention and energy for which he has in possession no fixed patterns of response.

The beginning pupil, nevertheless, has a way out of his difficulties. In the midst of the confusions of the school, he notices an individual who moves about with an apparent certainty of purpose. He observes a central figure who seems to know exactly what to do and what everyone else should do. To this individual, who appears to be the master of the new situation, he turns for guidance. In the primary school every eye is on the teacher. In the primary school everyone is willing, even eager, to follow the leadership of the teacher. Pupils of the primary school are docile, tractable, like a flock of sheep. The teacher can lead them into almost any activity, whether it is dressing clothespin dolls or attaching meanings to printed words, making a playhouse or arranging objects in specified groups. What the teacher considers important is perforce the important thing for the pupil to do.

Pupils in the beginning grades appear to many older persons to be interested primarily in objects. Objects do constitute much of the content of their experiences. Yet, appearances to the contrary, the study of objects is not their chief concern. Beginning pupils are interested in persons. The interest they have in objects is the interest which derives from persons. A child is generally more interested in the plaything another person holds than he is in the toy in his own hands, though the latter may be the more attractive. The American child wants a toy airplane, because he sees other people with airplanes; the Eskimo child wants a toy boat because he sees other people with boats. A primary pupil does not devote himself of his own accord to the grouping of objects, however brightly colored the objects may be. Yet he can become absorbed in piling up less attractive objects when his teacher suggests the systematic arrangements into which he can put them.

The tendency to follow the leadership of the teacher is not confined to beginning pupils. Pupils in later grades also will follow the instruction of the teacher who is a leader. Adults, too, are followers. Their susceptibility to leadership—bad and good—is a strikingly distressing phenomenon of our time. Gangs are gangs because they have leaders to follow. The members of a team submit themselves to the rigorous discipline of the coach who knows the game. Boy Scouts and Camp Fire Girls look to their leaders for instruction and guidance. In a similar manner, the students in the geometry class, or the literature class, or the music class, respond to the leadership of their teacher with an enthusiasm that is directly proportional to the amount and quality of leadership the teacher is able to provide. Older students differ from primary pupils in the tendency to follow a leader in the degree that they have learned not to follow blindly.

Children and youth are interested in the social arts. Young children are interested in doing or in pretending to do what they see their elders do. The child sees adults driving cars, and he plays at the game of being a chauffeur. He sees his elders writing, and he tries to do some writing of his own. He sees others in his family reading newspapers and books, and he peruses newspapers and books, held in any convenient position. Before he starts to school he looks forward with enthusiasm and pleasurable anticipation to the many activities in which he imagines himself engaging. When asked what he will do when he goes to school, his reply is characteristic and significant. He answers: "I will learn to read," "I will write on the blackboard." "I will count and do problems like Charley." He may show an interest only in the superficialities of the activities indicated. Yet his interest is a compelling motive for beginning the activities. It is a self-starter. It can carry him along until the activities begin to have deeper meanings than their surface appearances provide.

Youth incline as social pressures bear upon them. With adolescence they take a new interest in society, the interest of adjusting themselves to social demands. Much of their behavior which seems unsocial or antisocial comes from awkwardness in making adjustments or from a narrow view of society. To the extent of their understanding of social demands, they return to the social interest of their earlier years.

Youth desire social approval, though usually of the narrow social groups to which they belong. They like to be known as proficient in the social arts. When they are proficient in any one, they take pride in their accomplishments. When they show a lack of interest, they either lack understanding, or find the tasks that would lead to mastery less inviting than others in which they can engage.

Youth are interested in social modes of thinking. They pattern their thinking and the manner of expressing it after the modes and the manners which are in the scope of their attention. The fact that they frequently make themselves misunderstood in their contacts with older persons is the result of misunderstanding of the larger and more involved patterns of society.

Youth are interested in social activities. They do what their own groups do. Their responses may be individualistic, often painfully so. Yet they respond according to the notions they have gained of the way social creatures should act. Perhaps their most compelling motive is the type of behavior which to them is *the* type to engage in. They have ideals of behavior and are amenable to them, though their ideals are under more or less constant change.

The atmosphere of the school is a social force. The routine of the school, its organization and management, its assignments and direction of activities, the relations between teacher and pupils, personalities, and enthusiasms—all combine to make the school spirit. The school spirit is not a tangible thing. We do not see it. We do not hear it. Yet we feel its presence. It is not a set of rules of the teacher, and it is not the constitution and bylaws of a student-government organization. It is, rather, the common expectation that the school will be the kind of school all in common consider as good. Everyone, whether visitor or pupil, notes the school spirit the moment he enters. The school spirit is the prime social force in the school. For want of a better name we call it atmosphere. We do this perhaps because of its pervading quality.

The school atmosphere is pervasive. It enters and touches every phase of every activity. It surrounds every pupil. Depending upon its quality, it invigorates him or stupefies him in his every thought and action. It is, as we have said, a set of expectations, developed and developing in every pupil. Expectations impel the pupil to try to make them into realities. Expectations are the prime movers in the school. They encourage the activities of learning, or obstruct and inhibit them.

Summary. Like older persons, children and youth in the school are social creatures. The major source of their interests is people. They want to do what others do. They want to conform to the social group, large or small, worthy or otherwise, which sets the standards they understand and interpret as *the* standards they should follow. They are social imitators.

Our discussion of the motive of social imitation has moved through the development of the following points:

1. Social imitation is a compelling motive.
2. New situations influence reliance upon social patterns.
3. Young children turn to older persons for guidance and leadership.
4. Children and youth are interested in the social arts.
5. The atmosphere of the school is a social force.

2. The Motive of Individual Desires

Individual capacity modifies social imitation. While children and youth are creatures of their social environment, they are at the same time individualists. The ways they tend to respond modify the influences of the world that surrounds and impinges upon them. Their responses give the external world the significance it has for them. The external world is to them as it appears to be. They react not only to influences from without, but also to influences from within. They react, in a sense, to their own reactions.

Individual ability, for example, has much to do with the force of social imitation. Depending upon ability, success or failure accompanies the attempt to imitate the social pattern. Accompanying response is feeling, pleasurable or otherwise. Feeling gives color to the social situation surrounding the individual. Feeling gives to the social situation its meaning and its influence.

To illustrate, the presence of a game or an activity in which a child engages is a social force, but the character of his response is a modifying influence. The game impels him to participate. If success crowns his efforts, he gains enthusiasm. On the other hand, if he is clumsy and awkward, if he blunders, if his attempt meets with failure, he takes a different view of the game or activity. It no longer seems quite so appealing as at the outset. In either case, the child's ability to respond modifies the motive of social imitation.

To illustrate further, let us suppose the activity is one in which the primary teacher leads, the activity of connecting familiar meanings with new printed words. The pupil enters into this activity at once, because the teacher takes the lead. If, now, the activity gives success in connecting meanings and printed words, it takes on a significance, a motive force, which it could not possibly have had at the outset. The motive of social imitation expands by the addition of the motive of individual insight. If, on the other hand, the pupil fails to note the desired connection between meanings and printed words, no new interest is available. The activity soon becomes old and worn-out, with its original gloss of appeal rubbed off. The pupil senses a difference between his response and the responses of his classmates. He experiences a sense of failure. The activity may now become a repelling force.

The way the pupil responds to questions about number is another illustration of the way responses modify situations. The questions are a challenge or a piece of drudgery, depending upon whether the pupil sees them as clear questions calling for a kind of answer he understands or as rule-of-thumb guides to busy-work activity.

Pupils are individualists as well as social imitators. In the primary grades the normal pupil has been content to be a social imitator. His interest has centered in performing, or in pretending to perform, the same activities in which his elders engage. His interest has never turned especially to the character of his product. He has not been aware of how exceedingly crude his productions are. He goes through the whole of the primary-school period without manifesting any appreciable attitude of criticism of the work he does.

Gradually there comes a change. The pupil gives less attention to performance and more to result. He notices the productions of others. He compares the results of his efforts at reading, writing, drawing, arithmetic, and so on, with the results of the efforts of his fellow pupils and his elders. He becomes critical of what he can do, and tends to compensate by turning his attention away from social approval and inward upon himself. He cares less about complying in a wholehearted spirit of willingness with the demands the school makes upon him. His interest in himself reveals that he is now an independent master of reading, writing, and language—that is, of such parts of each as represent to him the whole. Henceforth, he desires to use these subjects for his own private purposes. In short, he is less a social imitator and more an individualist.

The change is especially evident among pupils of the intermediate grades. Hardly a pupil of these grades seems the same person he was a year or two previously. From the docile, tractable follower he was in the earlier grades, he now becomes, in not a few instances, a disciplinary problem. The intermediate pupil is so concerned with his own interests that he disregards the rights of others. He does not follow with his earlier enthusiasm the dictates of the teacher. He asserts his independence in social matters, when social controls are lax. In his studies he turns away from the directions of his teacher to his efforts to assert himself. He neglects the teacher's copy, and composes a note to his friend in a rapid, scrawling hand. He turns aside from his drawing models to caricature a fellow pupil or, sometimes, his teacher. He invents for private use a language of signs and peculiar word endings which is comprehensible only to himself and his friends. He is willing to read if by his reading he is able to secure information of immediate personal interest. In all his schoolwork, he retains an interest only in the activities in which he already has gained some mastery. He is unwilling to enter with enthusiasm into the activities of working for a mastery which he has failed earlier to gain.

Individual desires may counteract the force of social imitation. As the pupil moves through the school, he gains interests and enthusiasms which are unrelated and sometimes inimical to the learning activities the school seeks to set up. He enlarges his contacts with the everyday world and his concrete experiences in it. His expanding interests stimulate the seeking of newer contacts and wider experiences. Frequently, his growing abilities in the social arts do not keep pace with his expanding interests.

Here, then, is the source of conflict. The conflict is not a natural antagonism between school activity and out-of-school experience, demanding the imposition of the former and the crowding-out of the latter, or the dressing up of the former to appear like the latter. It is, rather, a fault in the gearing between two moving, developing forces—a fault of articulation. The pupil's ability to read, for example, or his understanding of number, has not developed rapidly or effectively enough to enmesh smoothly with his developing interests in concrete experiences. When the pupil reads with difficulty, reading is not a means of contributing to concrete experiences. He therefore turns away from reading to more effective means of gaining the information which appeals to him. When number relations are not clear to the pupil, they do not help him to bring order and arrangement to his concrete experiences. He therefore turns away from a consideration of number which he does not understand to those phases of experiences which he does understand. It no longer suffices that others read and use the relations of number. Reading and number are activities which his interests have moved away from and left behind. Individual interests have counteracted the force of social imitation.

Individual desires may supplement the force of social imitation. On the other hand, it turns out in the case of many pupils that their developing abilities in the social arts keep abreast of their expanding experiences. Their teachers of the earlier years did not neglect the opportunities to initiate them into the learning activities which lead to an understanding mastery of the social arts. Their teachers entertained no fond and uncritical belief that the pupils would grow naturally into such mastery, or that such mastery would appear under its own power in response to a need for its use. Instead, their teachers used every resource to guide them step by step in taking on, and in making a part of their mental life and attitude, the modes of responding and the methods of gaining and organizing information which are social, rather than individual, in origin. As a result, the social arts have now become in considerable measure their own individual possessions.

To pupils who are thus so fortunate, the social arts are much more than mere tools for use when they need tools. To such pupils, reading and number thinking and arranging ideas and expressing are not tools which, when the affairs of life demand, they search for, use, lay aside, and then forget until need again arises. The social arts are not outside such pupils, but inside them; the social arts are not an external veneer, but internal assimilations. They are parts of personality. When a person has learned to read, he henceforth undertakes to resolve his problems in terms of written language. This is because reading has given him a new way of looking at situations. In other words, reading has become part of his intellectual make-up which cannot be dissociated without a consequent altering of his manner of life. Thus, reading has become a part of his personality. Reading is his new personality responding in a new way in a new world that reading opens to his view. So are all the arts. Language is the vehicle of his thoughts. Arithmetic is his way of thinking about the numbers of things. Music is his expectations of that which uplifts the feelings, as well as his skill in performance.

The pupil who has gained a working mastery of the social arts uses them to gain, to color, and to arrange the concrete experiences which become a part of his personality. His use of the arts leads to experiences beyond his immediate circle of the known. What he gains in these experiences reflects back upon the social arts as he possesses them, giving them wider and more effective utility. Conversely, the pupil who has failed to gain a working mastery of the social arts finds no beneficial use for them. His attempt to use them in their faulty and inadequate shape limits the acquiring of concrete experiences. What is worse, it tends to give his limited, concrete experiences a faulty coloring and a distorted arrangement.

Knowledge of results may discourage or encourage effort. The effect of results upon a person's effort is a condition of his attitude toward them. It is not merely results that count, but what a person makes of them. His personal response determines what failure will do to him and what success will do to him; it does not determine merely the proportions of failure and success which make up the results he is able to gain. Failure does not always discourage effort and success does not always stimulate it. Back of the failure and back of the success is the character of the personality they impinge upon and strike. How the person has been trained, and how he has trained himself, to meet failure or success is the determiner of final results.

Commonly, failure discourages a person's effort. It often leads him to a positive dislike for what he must attempt to do. In the school, the pupil's dislike for his reading, or arithmetic, or algebra, or music, or literature, or science, usually traces back to failure of one kind or another. The pupil fails to get meaning, he fails to accomplish what he sets out to do, he fails to understand what his tasks require of him. In consequence, he lacks the interest that would impel him to continuing efforts.

Commonly, success stimulates a person's efforts. Success gives to efforts the appearance of being worth while. It suggests the possibility of further success through renewed and increased effort. It brings to the consciousness of a person the fact that his ability parallels in appreciable degree his desire to succeed. In school, the pupil's liking of his work usually traces to success. He understands his questions, knows the kinds of answers he should seek, and takes pride in his achievements.

The effect of knowledge of results depends on the degree of understanding. In the conduct of games and athletic contests, the players or contestants know and understand the results. Whether the results are favorable or unfavorable, they keep effort at a high pitch. Similarly, the events of the schoolroom, whenever results are in well-understood terms, lead to further events. In the activities of both the extracurriculum and the curriculum, the score board and the record book may make the results clear. When the pupil fails, he can recognize the points of his failure. When he succeeds, he knows the causes. Understood failure challenges further effort. Understood success stimulates further effort.

Motivation is a product of earlier training. The activities of learning are not merely the results of motivating influences. They are also the generators of the motives that may lead to further learning. From what the pupil knows and understands comes the motive for further learning. The pupil may sometimes recognize this motive. He must sometimes have help to recognize it. In the latter case, we may say that the teacher provides motive in advance of instruction. Yet the motive for further learning, if the pupil gains it, comes from his earlier training. The teacher can aid by referring to the earlier training so that the pupil gives it the proper attention. In any case, it is what the pupil knows and understands that is the point of departure for further learning activity.

Of what significance, then, are the interests of pupils in determining and setting up the learning activities of the school? Shall the teacher consider the interests of pupils the predetermined hereditary traits they possess and therefore in large degree antagonistic to social demands? Or shall the teacher consider them the result of social influences, both without and within the school?

One answer to these questions comes from recent studies of the arts and the organized modes of thinking and bodies of content the school provides for pupils to learn. These studies describe reading, for example, not primarily as a fully developed process of which the adult makes daily use, but as a process in various stages of development from immaturity in childhood to maturity in adulthood. They describe handwriting not only as a matured skill, but also as a developing skill. They define number not alone as a matured product of racial development, but more particularly as a body of ideas which develops slowly, and often imperfectly, in the minds of pupils. In short, the studies are not concerned with matured skills and processes and knowledge and ideas, but with unmatured ones as they develop in the minds of pupils. The studies take into account pupil interest and pupil ability, not primarily as determinants of schoolwork, but primarily as developing results of the social lessons the school conducts.

The program of the school gives a similar answer. The well-ordered primary school takes account of the fact that its pupils are interested in people, that they are socially imitative, docile, and tractable. It takes advantage of its opportunities by setting up the activities that lead to a working mastery of such social arts as reading, writing, and number. It seeks to lead to a rapid mastery in order that pupils may have it to aid in providing self-satisfactions when they reach the individualistic period of the intermediate grades. For example, the primary school regards as its chief undertaking the teaching of reading well enough so that pupils can use reading in the intermediate grades as a means of satisfying curiosity about the many appealing and interesting concrete experiences which are recorded in books. Similarly, the intermediate grades seek to carry the pupils along by directing their reading interests to the end that experience will be sufficiently broadened for the problem-solving and large topical studies of the junior and senior high schools.

The foregoing illustrations seem to indicate that the activities which the school sets up are conditioned by the interests of pupils. Upon this point the best argument is the negative one. Many pupils come to the intermediate and high-school grades uninterested in reading, or number thinking, or writing; and for them the whole program of the school breaks down. This lack of interest is the result of the training, or lack of training, which the school in earlier grades provided.

Interest in learning parallels learning. There are numerous illustrations of how the work of the school succeeds or fails because of the nature of the interests of pupils, or because the school gives, or fails to give, due regard to the interests of pupils in the organization of its work. It seems clear that the interests of pupils, whether favorable or unfavorable, are the products of social influences, whether good or bad. The interests of pupils in the primary grades are the result of the social influences of the home and playmates. The interests of pupils in the later grades are also the result of the social environment. In the latter instance, the training of the primary grades, such as it was, is a significant part.

The older school of the extremely formal type tried to emphasize subject matter without giving much thought to the interests of the pupils. The child-centered school of recent years has concerned itself with activities which the pupils consider worth while, and has sometimes subordinated the requirements of the subjects. Many teachers and students of education have sought to take the middle ground between the two extremes.

It is a mistake to neglect the interests of pupils. It is a mistake to neglect what the subjects require for a working mastery. A sensible program would neglect neither and would seek to bring the two into good working adjustment.

Summary. The interests of pupils are doubly significant. They are both a condition and a result of the work the school gets the pupils to do. The school can shape the conditioning factor of its success.

The fact that the motive of individual desires may help or hinder the learning activities which the school seeks to foster, depending upon the success or failure of earlier work in the school, has been developed under the following topic statements:

1. Individual capacity modifies social imitation.
2. Pupils are individualists as well as social imitators.
3. Individual desires may counteract the force of social imitation.

4. Individual desires may supplement the force of social imitation.
5. Knowledge of results may discourage or encourage effort.
6. Motivation is a product of earlier training.
7. Interest in learning parallels learning.

3. The Motive of External Pressures

External pressures may classify both as social motives and as individual desires. The pressures on the individual which come from such stimulations as reward and punishment, praise and reproof, goals to be reached, competitions, and the like, are external in the sense that they originate generally outside the individual. On the other hand, they are internal in the sense that they produce responses which are internal. In the former sense, they are social; in the latter sense, they are personal.

The external pressures we are considering are the ones which society, or a person's social group, brings to bear upon him for the purpose of influencing him in one way or another. They are the kind whose values are in terms of the values of the situations to which they lead. They differ thus from the pressures of the ordinary and central activities of the social group. They do not compare with language, music, reading, and the various social arts and conventionalities which are activities of importance in their own right. They are means to later and more important ends. To illustrate, the pupil gets a reward from his parent for bringing home a good report card; or the team puts forth its best effort to play the game in order to run up the score. In either case, the incentive is not the thing of central importance. The parent does not emphasize the reward, and the good coach does not unduly emphasize the score. It is the good report card which has the emphasis in the one case, and playing the game for all it is worth, in the other.

External pressures are convenient devices because they become so readily internal desires. The parent does not have to emphasize the reward he gives his child for a good report card. The coach does not have to emphasize the desirability of a larger score. The reward and the better score are immediate ends and are in themselves desirable and attractive. They have, or seem to have, so much well-understood and easily appreciated value that they can make desirable and attractive those ends and goals whose values are less apparent.

Rewards and punishments are incentives. It is common observation that pupils respond to the hope of reward and the desire to avoid punishment. We may supplement common observation when we study by close observation the responses of learners to rewards and punishments. Both have been found to be effective incentives to learning.

The effects of rewards and punishments are, however, not wholly positive. These incentives stimulate not merely the learning activities which the instructor seeks to encourage, but also an attitude which in some instances is measurably unfavorable. In other words, these incentives are overstimulative in that they produce internal tensions and emotional disruptions. This is especially true with respect to the use of punishments and the overuse of rewards. We should conclude that it is all very well to stimulate learning, but in doing so a person should seek to avoid stimulating internal responses that are inimical to learning.

Praise and reproof are incentives. Although rewards and punishments as incentives to learning may have a use in certain unusual cases, their less physical correlates of praise and reproof have a better recommendation. These, too, may be overdone. But when used with discretion, they seem to possess all the virtues of physical rewards and punishments and to be less stimulative of accompanying emotional disturbances.

Praise for success and reproof for failure are more effective than indiscriminate praise and reproof. In the former the pupil gets the idea of what to emphasize in later efforts and what to avoid. Praise is more effective than reproof, since reproof is usually overstimulative. Reproof not only calls attention to mistakes to avoid, but also serves to misdirect the attention. When we pay attention to the thing we should do, we succeed better than when we pay attention to what we should keep from doing. Often the worst way for a person to keep from making a blunder is to key himself up with too high a resolve not to make the blunder. The goal to gain and the road to the goal should determine the way we direct our attention.

Immediacy of a goal is an incentive. We have noted that the goals of schoolwork do not make their appearance to pupils as a preliminary to the schoolwork we wish them to do. The goals come into view only as pupils approach them in learning. The goals are the ends which give direction to the teacher's program, but they are not effective motives until they begin to come into the view of pupils who are succeeding.

A student may expend much effort during the afternoons of a school week in athletic practice with his teammates. He expends much less effort during the week studying his lessons in geometry. The reason is clear. The goal of his athletic practice is the game on Saturday afternoon. The goal of his geometry lessons is an understanding of proof. He may willingly concede that the geometry goal is more important. Yet it is a far-off value. Similarly, the immediate goal of gaining a yard or a foot on the next play is more important at a given moment than the goal forty or sixty yards away. For present effort, a person needs an immediate goal. If he reaches it, he may move ahead to succeeding immediate goals, and on and on to the far-off, and more important, goals.

Definiteness of the task corresponds with immediacy of the goal. An assignment which the student understands stimulates his effort much more than does an assignment he does not clearly understand. When the teacher assigns a task and makes it clear and says, "Do it now," he provides more incentive than when he says, "Do it tonight." When the teacher holds the student responsible not only for performance but also for fairly exact performance, by frequent recitations and by frequent tests of performance, he further stimulates the student. The recitations and the tests, of themselves and directly, may not be valuable. Yet in their results and indirectly, they are effective. They give definiteness and impressiveness and immediacy to the goals of the learning activities which the teacher seeks to set up, direct, and encourage.

Competition and emulation give importance to goals. Advancing the ball a yard on the playing field seems often to take on considerable importance. This is because of the competition of the opposing team. Moreover, the stronger the opposing team, the stronger is the motive for trying to advance the ball. The competition in a game gives it zest. The competition calls forth the best efforts of the contestants.

The old-fashioned spelling bee and ciphering match were highly stimulative of certain types of intellectual endeavor. Similar types of contests between well-matched contestants might very well be given a larger place in schoolwork today. When overdone, contests produce undesirable results; but this problem could be avoided through the exercise of discretion by the teachers. Rivalry can be friendly rivalry. It can also be kept within bounds so as not to overshadow the results it is intended to foster. It is valuable because it gives to goals an immediate importance which they do not otherwise seem to possess.

Competition, rivalry, emulation—all need to be managed. They may otherwise overemphasize the activities and accomplishments of others and distract attention from one's own efforts. Competition against oneself, trying to beat one's own score, avoids this danger. Here, the efforts of others do not enter as overstimulations or distractions. At the same time the goals just within reach of the student competing with himself are given an impressiveness sometimes equal to that given by a competition with others. The golfer who tries persistently to beat his previous record is a case in point. The student who tries to write a better paper or to produce a better report than he did the last time is another case in point.

Measured attainments stimulate learning activity. The golfer is stimulated to try to beat his own record because his record is a measured attainment. The student will be stimulated to improve to the degree that he has a definite record of attainment to improve upon. This is one advantage of tests and measures of achievement. These devices provide an understandable standard by which the student can gauge his efforts. They provide him with a feeling of knowing what he has done, and what he must do in order to improve.

Summary. External pressures are valuable as incentives to learning activity only to the extent that the individual is able to respond to them with intelligence. He must be trained up to the point where their effect is not misleading, or they must be brought down to his level.

The values of external pressures have been indicated in the development of the following statements:

1. External pressures may classify both as social motives and as individual desires.
2. Rewards and punishments are incentives.
3. Praise and reproof are incentives.
4. Immediacy of a goal is an incentive.
5. Competition and emulation give importance to goals.
6. Measured attainments stimulate learning activity.

The central thread running through the discussions of the entire chapter has been that good schoolwork generates its own motive, that interest in learning is quite as much a product of previous learning as it is a stimulus to further learning.

Chapter 20

The Transfer of Learning

Purpose of the chapter. "I am a part of all that I have met," wrote Tennyson, the poet. With equal truth he might have written, "All that I have met is a part of me." For the influences of the external world, as they appear to a person, and of his internal world of ideas and feelings and tendencies, as he has created it, do more than stimulate responses. They also produce a different person, however small the difference. The way he responds leaves its residue of meaning and attitude and tendency. Never again is he exactly the same.

What a person learns is more than the result we commonly consider it to be. Learning is also a causative influence. It is more than a new acquisition by the person. Learning is also a possessive influence. Learning is unlike a person's coat which, if he does not like it, he can take off and lay aside. Learning, good or bad, much or little, pervades the qualities of his being. It adds coloring to his personality, however imperceptible. A person may think that he picks up his learning and carries it elsewhere for application as he may choose. Actually his learning is a part of him, goes where he goes, whether he wills it or not.

We have no question about whether learning transfers. We have only the practical questions: (1) What are the kinds of transfer? and (2) How may we teach for transfer? The purpose of the chapter is to seek answers to these questions.

1. Kinds of Transfer

All learning produces an effect. Learning is the change in attitude and mode of responding that comes from experience, both direct and indirect. It is what experience contributes to personality. When a person learns, he changes. He is never again the person he was. He is better or worse, more adaptable or less adaptable. His surroundings, the situations he meets, also are not again the same. Learning works a change in the way they appear. Physically they may not differ. It is the way the person henceforth responds to them that gives them the changed appearance. Learning adds a new and different tint to the intellectual spectacles through which the learner views his surroundings. His surroundings appear henceforth in a new and different coloring.

When a person's responses to certain situations remain the same, when they persist as merely habitual responses, he has had no learning with respect to them. When his responses make no change in his attitude toward the situations in question, there is no learning with respect to the responses. This, of course, is hardly possible, because continuation of a response makes it more habitual. It digs deeper the rut of action, and that, too, is change. If the change is slight or imperceptible, learning is likewise slight or imperceptible. When there is no change, there is no learning.

We may illustrate. A continuation of a person's habitual response to six times nine is no change; hence, there is no learning. His response may be the correct one, accompanied with a slight hesitation in deciding between fifty-four and fifty-six. Let us suppose that accidentally or otherwise he notices that the total of the five and four in the product is nine. From now on he recalls this addition when he must answer the question, "How much is six nines?" His multiplying is not the same as it had been. The old hesitation has vanished, and he responds to the question with an air of certainty. The new idea—the new learning—has worked a change in attitude and in mode of responding. Learning is an effect—in common parlance, produces an effect. Where there is no effect, there is no learning.

The effects of learning often seem specific in character. Intellectual growth from day to day is imperceptible. General ideas develop slowly. It is a rare occasion when a new idea bursts in upon a person, giving a new insight. Any such sudden burst is more apparent than real, for the new idea and the new insight are the product of slow accretions, here a little and there a little, extending back over a long time. The student does not prepare all his lessons at once. He must solve his examples one at a time. He must perform each little part of a single lesson before he can go on to the next. The student does not learn everything about his subject at a sitting. He must learn a little today and a little tomorrow. Generally, what he learns on any given day is so small as to be by itself inconsequential. Each bit is a single brick. The single brick does not make the wall, yet it adds its imperceptible share to the total.

Because the student must give much time and effort to the gaining of only a small bit of learning, he develops the tendency to give attention to each separate bit as a thing in and of itself. Each day's lesson is at the time a lesson in and of itself. Each day's lesson has its own title. What each lesson leads to has its own separate name. For the time at least the student must feel that each bit of learning, each with its separate demands, each with its special title, is a separate and special unity in and of itself.

The older psychology has contributed to the view that learning is in specific bits. It has simplified the process of learning in terms of synaptic connections between nerve endings in the brain. In the brain there are countless possible connections between nerves which bring in stimulations and nerves which carry away impulses of response. Learning, as the older psychology describes it, is the connection, the synapse, of the afferent nerve endings with the efferent nerve endings. Learning is, as it were, a kind of "hook-up" between an incoming and an outgoing telephone wire. The two wires which make possible a single connection are present, but unconnected, before learning takes place. When one receives a stimulus from a new situation, the impulse comes in, the synapse occurs, and the impulse moves out over the new pathway of discharge. The connection becomes more and more a fixed and unbroken connection. Hence, one synapse is one bit of learning, another is another bit, and so on; learning develops through repetition of similar impulses which strengthen the synapses; learning is a complex of many separate connections or habitual tendencies to respond.

The older psychology explained that a complex situation involves a number of synaptic connections. It pointed out that similar situations involve certain synapses in common which can bring the situations into relation each with the others. Thus, a repetition of response to situation A would strengthen the synapses involved, a, b, c, and d, let us say. Now if a new and similar situation B involves the synapses c, d, e, and f, training with situation A would help one to meet situation B, because of the common synapses, c and d. In other words, the identical elements in situations A and B makes possible the transfer of learning from one to the other. This theory is known as the theory of identical elements.

The effects of learning are general in character. Though we may take learning apart in our thinking and manner of speaking, and give specific names to the parts we thus separate, we do not thereby make learning a simple process having specific effects. Learning does not always work mechanically, even when it seems that it should work that way. It so happens that what many pupils learn in adding does not help them in learning to multiply. For many pupils the similarities between the two arithmetical processes do not exist. Yet the inabilities of these pupils do not disturb or remove the identical elements which are actually present. The inabilities simply dispute the right of identical elements to serve as the explanation of the help in learning multiplication successful pupils gain from what they have learned in addition. However simple any given bit of learning may appear to be, the responses which produce it are never simple and the situations which stimulate it are likewise never simple.

The response to a situation is the response of the whole organism. When the beginner responds to his perception of a letter or a word by attempting to write it, his response is not a simple reaction, but a complex one. The beginner moves his whole body —his head, his left arm, even his feet. Later, when he can write, he has but succeeded in dropping off many useless movements and reducing the response of the whole body to a complex muscular coordination. The muscular coordination of the adult in writing is not confined to any single set of muscles, for he can write a small letter on his paper or a large letter on the blackboard with equal ease and with such similarity of style that except for size neither can be distinguished from the other.

The stimulus of a situation is never a single specific stimulus. It is true that we often speak of a stimulation and of the situation which produces it as simple or specific, but we do so merely as a manner of speaking in order to distinguish some stimulations and situations from others which are more complex. An earlier chapter has made reference to the fact that we see nothing just as it is, but as it appears in its relation to its background or setting or context. For example, we see the green grass as green, however its hues are changed by light and shade.

Mental activity is not a localized function of any part of the nervous system, but, rather, response according to a relational pattern. Experimentation gives no evidence of definite localization of learning functions in the cerebral cortex, but, instead, indicates that in learning the cortex acts as a unit.

The effects of learning are often hard to observe. It frequently happens that we look for a transfer of learning between sets of situations which seem to have similar relational patterns, but look in vain. For example, many of the learning activities in the school are disappointing in the effects which they produce. The pupil learns how to multiply or to find the per cent, but he does not sense the uses he may make of multiplication and percentage. The student completes a course in geometry and can reason no better about matters outside the content of geometry. He pursues a course in Latin without sensing the possibility of better usage in the language of his mother tongue. Our observation of such failure leads us to the conclusion that training in computational arithmetic does not carry over to the solving of practical exercises, that training in geometry does not transfer to reasoning about nongeometrical matters, and that a knowledge of Latin is a thing quite apart from the use of English. As a result, we are inclined to question the values of training. What value comes to pupils from the study of arithmetic? Why should students learn geometry when they have no use for it? What is the good of Latin? In short, is there after all anything of importance in this whole matter of transfer? If transfer ever takes place, is it not in such instances largely accidental?

There is an additional question which we as doubting individuals should ask. Did the pupils who seemed to receive no benefits from their training really have any learning to transfer?

We should reflect that transfer does not take place in a vacuum, that a person must have some learning before he can transfer it, and that the learning some pupils acquire in certain courses is often in amounts infinitesimally small.

Learning effects are frequently so small as to be unobservable. This we may explain by the fact that we as teachers all too frequently take for granted that our pupils are learning before they have had sufficient opportunity really to learn anything of value. We have long since traveled the road of learning which we try to induce our pupils to travel, and so to us the road seems easy. We need to make only slight effort to recall and to see again in all clearness the difficult passages in the road. We understand or think we understand what we must teach. In consequence, we can hardly keep from feeling that our pupils can easily come to understand the same things. To us everything seems clear; hence, everything should become as clear to our pupils. In short, we read into the abilities of pupils our own more mature accomplishments.

As a result, we as teachers frequently take too much for granted. We interpret the recognition of printed words as reading for meaning. We consider the motions of multiplying an indication of understanding. We think that our pupils are aware of the general applicability of a law in science when they can repeat the words of the law and the accompanying illustrations of the text. We too often think that an introductory lesson—accompanied by a few scattered references to familiar experiences—on percentage, on square measure, on gravitation, on evolution, on tolerance, on freedom of speech, or on representative government, is all our pupils need in order to gain possession of these general ideas. A page of explanatory discussion in the text revives in us an understanding of the implications of a problem, or of the applications of a rule of procedure. So we think that the page should develop a similar understanding in our pupils. We thus take for granted learning on the part of our pupils before we give it a chance to take place. In consequence, when we look for the effects of learning on subsequent activities, we find that effects are not present.

When the pupil has learned how to multiply, we think that he should also have learned the meaning of multiplication. Often he has not. When the student has completed a course in geometry, we think that he should have learned a method of proof. Often he has not. When he has completed a course in Latin, we think that he should have sharpened and quickened his vocabulary of meanings. Often he has done neither. Because we assume that reasoning and enlarging the vocabulary are necessary results of the student's mere presence in geometry and Latin, we often make no special effort to teach either reasoning or the derivation of words. Later, when we look for the beneficial effects of training in arithmetic, in geometry, in Latin, or in any other subject in which we take for granted meanings and understandings, we look in vain. The effects are not present. All too often they are not present because we did not provide for them.

Learning may have negative as well as positive results. The kinds of school training we have been citing are not only not helpful, but in many instances are definitely harmful. Instead of stimulating newer and wider interests, they often engender in students a positive dislike for the content with which they deal. Instead of cultivating ideas of relationship, they often succeed merely in providing students with accretions of unrelated items of information. Instead of providing means of organizing the experiences which contact with the affairs of the world gives, they often merely add to the growing confusion of students by providing more unassimilable experiences. It is a hopeful sign that many students have learned to harden the armor of their defense against these kinds of training and to take just enough to get along with their teachers.

The attitude of students within the school has its parallel in the attitude of practically minded persons out of school. The latter value experience in any given calling only up to the point where they think it is enough, but not too much. They note that the worker with some experience has an advantage over the worker who has none, and they also see that too much experience hinders instead of being a help. They have observed that long experience frequently serves to get one into fixed habits and to render him less and less adjustable to new conditions and new demands.

There are two types of workers in every calling. Both improve their work through experience. Insofar as the experience of the day-by-day activities of their calling is their teacher, neither has the advantage of the other. And insofar as their calling remains the same from day to day with no changes and no new demands, neither has an advantage over the other. Experience drills both into becoming better and better routine workers. But the one is a mere routine worker whose attention never wanders far from his routine activities. The other is also a routine worker, but he is more. He studies the relations between the various elements of his routine; he develops a principle which clarifies the necessities of his routine; he works out a degree of understanding of how his routine fits into the routine activities of others who are engaged in the same calling. All this does not make him a better routine worker. Nonetheless, the latter worker gains an advantage over the former. He is the first to be promoted. He is made a foreman, a manager, a superintendent; and his companion remains a routine worker. Or, if the calling changes, if the plant scraps its old machines to make way for more efficient ones, it is the latter worker who can readily make the new adjustments the new machines require.

The worker who gains promotion or who adjusts himself readily to new demands is the one who gets our attention. He is successful, and success attracts attention. Yet the routine worker who must remain at his task while others gain promotion over his head is equally deserving of our attention. He is the worker who in the midst of technological changes gravitates sooner or later to the scrap heap of industry. He is the parallel of the student who moves through the courses of the school without gaining intellectual aid. Both worker and student, if not helped, are apt to be harmed. Learning is negative as well as positive in its effects.

Negative transfer results from routine learning. When learning is merely routine, or the mere going over and over of the same sets of activities, the mere acquisition of information, or the mere development of skills and habits, its transfer effects are negative. The reason is that the learning gets into a set pattern which adjusts with difficulty to new situations. The new situations require that the person put forth effort to overcome the earlier modes of thinking and ways of responding. This leaves only a part of the person's total effort for the new tasks he undertakes. Or if he tries to give his whole attention to the new task, he may be entirely unmindful of his earlier training. Still the effects of earlier training remain, since it is characteristic of habit to be mechanical, to act automatically, with a minimum of conscious thought and effort. In either case, the response to the new situation is incomplete. In the one case, effort must keep earlier tendencies under control. In the other, earlier tendencies work without restraint.

It does not help if in the new situation there are elements identical with certain ones in the learning situation. The elements are in a different pattern, and habitual modes of responding do not fit the new pattern. It is no help if the learner is aware of the identity. The force of habit does not suddenly fade through the consciousness of need of a newer mode of response. Mere awareness of identity gives no insight into the way an older tendency or response may take a new direction. Then too, mere awareness of identity may itself be a hindrance. It may encourage consciousness of failure, and thereby serve as a disturbing element. Or it may encourage the person to persist in trying to meet the new situation the way he met the old. Or it may encourage him to overdo his efforts to overcome the force of the older tendencies. The routine worker without theory is certainly not unconscious of the identical elements in the operation of his old machine and of the new one that replaces it. Yet his earlier training is a hindrance, not a help.

It is common observation that many types of school training hinder the later activities of students. Because of their earlier training in slow, analytical reading, many students have difficulty in grasping the sequence of a topic. Because of their earlier training in literature classes, many students after graduation never read a single selection of the world's best literature. Because of their earlier training in meticulousness in composition, many students have difficulty in composing their ideas in writing. In many instances the earlier training the students have had in a given subject hinders the progress of learning in the later stages. The conscientious teacher must frequently reteach and teach in a different way much of what his students already have learned. He has to deal with the negative results of the earlier studies of his students.

Positive transfer results from ideational learning. The remedy for routine is not that of abandoning it, for routine may be useful as the basis of a type of learning. Habits, skills, facts, and experiences, which by themselves are negative in their transfer effects, are the materials that extend learning. They are the sources of the ideas which give them life and make them dynamic.

The worker who develops a theory or principle or idea of purpose about his work finds it useful in any new situation he has to meet. As a beginning worker, he has to be industrious to acquire the necessary skill and to overcome his unskilled efforts. He has to make and keep himself alert in order to adjust to the routine of his work. Yet he learns more than routine. With his routine learning he works to develop an idea or principle or generalization or theory about the routine of the work he must do which will resolve his work into an understandable pattern. Finally, when he must confront the new situation of a change in working pattern, he can recognize in its differences the employment of similar principles of procedure found in the old situation. He brings to the new situation not merely a particularized form of training, but also an idea that relates his new work to all he has learned in his earlier work. He can shape his earlier training to new and different demands.

The difference between our two workers is not a difference in practical training. At the outset, both must work, must have experience, to get useful training in the work they do. Later, for one worker the useful training is not useful, but a hindrance; for the other worker, the useful training is a help. The difference between the two workers is that the latter worker is intelligent about what he has learned. He has an insight into what his training means. He can distinguish similar relations among the dissimilar elements of new and different responsibilities. He must work for his training, as must anyone. Having gained his training, he can transfer it intelligently and helpfully.

The student who builds ideas of relation in the things he learns will constantly meet possibilities of transferring his learning in helpful ways. The beginning pupil who notices in his new printed words a characteristic similarity of form—"*Jack* looks like *Jill*," "*Nick* looks like *Dick*"—is developing an idea which can start him toward becoming an independent reader. The pupil who develops the idea of adding as the combining of groups that are generally unequal may readily think of multiplying as the combining of equal groups. The pupil who gains the idea that he adds tens the way he adds ones learns the more readily to deal with tens the way he deals with ones when he subtracts and multiplies and divides. The student who learns how to gain the sense of a selection of literature by deliberately reading for a total view, then studying the details, and then uniting the details into his total view, learns both literature and a method of study. He brings to all his subsequent reading the method of study that has proved useful. The student who learns method of thinking as well as content in his course in science is thereby better prepared for later courses involving similar content, and also better equipped for studying the content in any field. Such pupils and such students gain ideas of similar relations among dissimilar elements, and they can deal with the new combinations of dissimilar elements they meet.

Negative transfer is automatic; positive transfer is intelligent. We may summarize our discussions to this point in the following three statements:

1. Learning is always an effect. It is a modification of the individual, of his whole personality, of his totality of attitudes and modes of responding. To the situations of whatever nature which he subsequently meets, he responds in a different way. His learning always transfers, however imperceptibly. He cannot separate himself from the results of his earlier experiences.

2. Negative transfer is automatic. It occurs in spite of the individual, whether or not he is conscious of its happening. When learning transfers itself, the transfer effects may be negative. Automatic transfer often is a hindrance.

3. Positive transfer is intelligent. The individual not only has acquired learning which he may put to use, but also has developed ideas about how he should use it. He not merely knows; he also understands. In earlier learning situations he has acquired ideas of organization and of relationship. These he brings to new situations as keys to unlock their hidden meanings. He is not the slave of his learning, but its master. His learning does not use him; he uses his learning. This type of transfer is positive, useful, helpful.

Summary. Our discussion has avoided the useless and misleading question as to whether transfer of learning is an actuality. Instead, it has developed the fundamental fact that all learning is a change, however small, and an influence upon subsequent behavior. The discussion has contrasted two kinds of transfer—

namely, negative and positive—under the following topical points:

1. All learning produces an effect.
2. The effects of learning often seem specific in character.
3. The effects of learning are general in character.
4. The effects of learning are often hard to observe.
5. Learning may have negative as well as positive results.
6. Negative transfer results from routine learning.
7. Positive transfer results from ideational learning.
8. Negative transfer is automatic; positive transfer is intelligent.

2. Teaching for Transfer

Avoid narrowing the learning of students. No single subject of the school carries in its own name the guarantee that profitable transfer effects will follow its pursuit. Whether the study of the subject will be beneficial or harmful, broadening or narrowing, depends on the way it is taught and learned. Both "business" English and "practical" arithmetic may turn out to be highly impractical subjects. "Dead" Latin and "ancient" history may become full of life and interest and up-to-date importance.

A given subject becomes for the student very much what his teacher makes it. If it revolves around its own center, it does not develop or shed light upon new interests. If the teacher makes it appear as in a vacuum, the student will learn it as in a vacuum. But if the teacher has the student work out relations and consider what they imply and suggest, the student will gain ideas and attitudes and points of view. The stream of learning may not rise as high as its source; in the case of most students, it does not rise higher.

The teacher should neither be skeptical of the worth of his subject nor have a blind faith in all it seems to promise. If he doubts the worth of his subject, he will not be on the watch for possible values to emphasize and develop. If, on the other hand, he has the uncritical belief that good results are bound to follow the study of his subject, he may tend to expect the good results to come automatically. In either case, his attitude is unfavorable for setting up the best type of teaching procedure. Does training in the various subjects of the school transfer in considerable amounts?

Is such transfer negative or positive? No dogmatic answer satisfies. The correct answer is that the way the teacher gets the student to attend to what the subjects present determines what the resulting learning will be.

Teach students methods of study. There are several advantages of teaching students methods of work and methods of study. The methods remain though content fades away. Yet the content gained is more a fixture because of the associations emphasis upon methods provides. Consciousness of method along with the use of method fosters independent work. The student must rely on his own effort as he develops the tendency toward self-reliance. In addition, the use of definite methods of study produces results of which the student can be sure. And with his success and growing confidence there develops also a personal pride in accomplishment. The resulting learning has thereby all the more a personal coloring and a personal flavor. It is thereby all the more a definite contribution to the personality which transfers to any work the person may do.

Emphasize the development of general ideas. A general idea serves as a pattern of relationship a person can bring to new situations to order and classify them and make them understandable. The idea of per cent can make clear the relations between the quantitative elements of situations in personal, business and civic affairs. By means of the idea of per cent a person can translate new quantities and amounts into understandable relations with quantities and amounts which are familiar. The idea of growth and development suggests a means of interpreting the expanding and the changing functions of an organism, of a personality, or of a social institution. Losing a dime from one's pocket and spending a dime at the store are different situations. The general idea of subtraction brings to light their similar elements and thus makes clear the common way of resolving their results.

The growth and the service of general ideas stand out in the conduct of the study by primary pupils of the ways of living of primitive peoples. In the study of the life of the Indian, for example, the teacher organizes stories of interesting incidents to emphasize first one general idea, then another. How the Indians supplied themselves with food, how they dressed, how they built their wigwams, how they traveled, how they traded, and how they made things with their hands are the centers of interest. Various reviews and discussions, objective illustrations, and dramatizations emphasize the general ideas of food, clothing, shelter, transportation, commerce, and manufacturing; and each idea gets its appropriate title or designation. Finally, when the pupils leave the study of Indian life to take up the life of the shepherds, or of the vikings, or of the pioneers, they have in mind at the outset of their new study certain organizing ideas and modes of attack upon the new and different information with which they must deal. They find relations among the new items of information that are similar to relations which grew out of their earlier studies. They thus transfer to new situations modes of organization and modes of attack which developed out of older ones.

Do not neglect necessary details. Details, which in isolation may be unimportant, are the necessary materials for a structure of ideas. The teacher should select them for examination, not as items of importance in their own right, but as content for the ideas which they may suggest and emphasize. Merely because a detail may be interesting is not reason enough for including it. Conversely, merely because a detail may be uninteresting is not reason enough for excluding it. The study of Indian life by primary pupils must exclude many interesting details, because these details do not contribute readily to the general ideas of food, clothing, shelter, transportation, commerce, and manufacturing, and because they would exclude the details that contribute to the ideas. The study of arithmetic and algebra in the later grades must include much practice in solving exercises which in themselves are not highly practical in order to enlarge the ideas the exercises illustrate. A case in point is the solution of exercises in the second and third cases of percentage. These two types of exercises seldom appear in everyday practical situations. Yet they are highly important for purposes of training. They serve to illustrate and to develop phases of the idea of percentage which exercises in the more common case one do not portray. Then, too, the idea of percentage gives an importance to cases two and three which far transcends their practical computational use in everyday situations. A person may use only case one in his computations. He needs the whole idea of percentage as a basis of interpretation in situations which are noncomputational.

Avoid overemphasis on practical applications. A practical application is a mere detail of a course of instruction, and the teacher should so deal with it. Yet the practical application does possess a value in and of itself. It is as valuable as it is practical. Its practical value can add to the general idea which the teacher seeks to develop. The general idea may thus gain added illustration and extra illumination from the practical application which at the moment is the center of attention. The idea may thus gain a significance it would not otherwise have. An idea always gains importance from the practical everyday usage it may have.

Practical applications need to be handled with care. The reason is that each seems at the moment an end in itself. Often the practical application turns out to be an illustration which seems more attractive and more important than the general idea it should illustrate. It may very easily carry the pupil away from the central idea through its intense demand for the whole of his attention. It then becomes, not a means to an end, but an end in itself, a kind of blind-alley. Any given practical application is particular in its nature. It is never exactly the same as another practical application. The practical application of the training of one worker of our earlier illustration turned out to be dissimilar to the practical requirements of a change of work or of growing responsibilities. The practical application of subtraction when one loses a dime may be different from the practical application of subtraction when one spends a dime. The situation of losing a dime may becloud the idea of subtraction just as enlarging responsibilities may distract from the idea of making adjustments. Similarly, the use of percentage as a means of finding the standing of a ball player may suggest more about ball playing and less about percentage.

In short, teachers should make use of practical applications to provide vividness for general ideas. Yet they should use practical applications with care, and not overemphasize them. The applications may have so much of vividness in themselves as to attract attention away from the ideas they should throw light upon.

Teach the subject as a logical unity. A school subject has its details and divisions. Each part of the whole has its own special interest and frequently its own special practical application. Each particular practical application may contribute to an understanding of the total meaning, or merely to an immediate opportunity for transfer. The transfer effect is necessarily narrow and restrictive. It cannot multiply with other corresponding transfer effects to produce the transfer that an understanding of total meaning can provide. This is a case of the sum of the separated parts being less than equal to the whole. To illustrate, we may use each of the various parts of an automobile for a special practical purpose: a bolt to give stability to the legs of a workbench, an inner tube to provide fun for the children in the swimming pool, or the engine to provide the power for a piece of machinery. Yet it is not these uses of parts that commonly engage our attention. We are interested in the whole automobile with all its parts working together in unison.

A student, of course, may not at once see or acquire the total subject as we may see or acquire an automobile as a whole machine. He may not purchase with his effort the subject as a complete unity. He must acquire a part at a time, and he must build the parts into a unity little by little as he proceeds. This is perhaps the chief reason why the student needs a teacher who will guide him toward a grasp of unities of wholes by requiring him to turn his attention from interesting parts here and there toward relations between them. The teacher must teach parts and details one by one. Yet his chief task is to cultivate the imagination of the student so that the student may get a glimpse of the total picture he may construct from the parts of the jigsaw puzzle of the subject he is studying.

The student's logical interest in a subject, once he begins to develop one, far transcends any immediate practical interest he may have. Having logical interest, he may move from part to part of his subject and from one stage to the next. He may finally discover in the subject its greatest uses and its greatest practical values. The student who has mastered the art of reading has far more than a collection of particular tools for particular uses. The student who has learned and who appreciates the method of proof as an artistic unity is never satisfied with the pseudo proof and the near proof that he encounters in many discussions of everyday affairs. The student who learns to think of his language or of number or of music as a great social institution finds in each an ultimate practical usefulness that never reveals itself to the student who trains in mere practical uses.

For further illustration, we may turn to the familiar embarrassing and often baffling situation of the pupil in arithmetic who does not transfer his ability in computation to the solution of practical problems. This pupil is the product of the type of instruction he gets in our schools. Through influences from the past there persist in our schools at the present two seemingly diverse types of interest—namely, interest in computation and interest in problem-solving. The pupil learns computation as one thing and problem-solving as something else. The pupil learns the operations of arithmetic, and then he learns to solve problems. He first must learn the "number facts" and "combinations," and then he must try to "apply" them. For the two kinds of activities to perform, or of things to learn, or of goals to attain, there are two different techniques of instruction. Computation and problem-solving persist in our schools as separate activities and as distinct interests. Instead of expecting transfer from one to the other, we should expect what we actually get, which is little or none.

Many teachers of arithmetic, however, find among their pupils little disparity between ability to compute and ability to work problems. These teachers stress the ideas that make arithmetic a unity. They try to get their pupils to see that a practice example and a problem exercise, though different in form, present the same question. They try to get their pupils to pay attention to the common question, the common way of finding the answer, and the common answer that fits the common question, whatever its form may be. As a result, their pupils have no difficulty in making a transfer from what they learn in computing to what they should do in problem-solving. Their pupils encounter no difficulty, because to them the two types of process are so close together in thought that doing the one does not differ from doing the other. To them, the example and the problem present the same idea in different garments.

Teach the subject as a thing of importance in its own right. To provide transfer effect, we should teach the subject, or the part of it for which the students are ready, for all that it is worth. We should make the subject—its mastery by the students—the matter of central importance. We should trace out such of its implications as will give it worth, bring to it such illustrations as will contribute to its meaning, and emphasize such relations as will broaden its applications. We should use every illustration, explanation, practice exercise, and practical application as a means of building up its meanings in the minds of the students. We should not at any point lessen its value by showing it up as a means to an end; instead, we should make it the end of all with which it connects. Only by giving to the subject all the importance we can bring to it, only by centering in and toward the subject all the meanings that can relate to it, only by making the subject the primary concern and the things which lead to and away from it secondary, can we make it broadening, instead of narrowing, in its effects. There are the immediate ends of practical applications to everyday affairs which isolated parts of the subject may serve at once. But the serving of immediate ends should not sacrifice the breadth and the unity of the subject which make possible the more valuable and permanent ultimate ends.

Summary. No subject carries in its own name the guarantee that its transfer effects will be positive and profitable. What the subject will amount to depends on the way it is taught and learned. If the teacher desires positive and profitable transfer, he must provide it. The following suggestions deal with teaching for transfer:

1. Avoid narrowing the learning of students.
2. Teach students methods of study.
3. Emphasize the development of general ideas.
4. Do not neglect necessary details.
5. Avoid overemphasis on practical applications.
6. Teach the subject as a logical unity.
7. Teach the subject as a thing of importance in its own right.

Chapter 21

The Measurement of Learning

Purpose of the chapter. The program of the school needs constant evaluation. Whether it adjusts to the developing abilities of pupils, whether it is in proper balance, whether it undertakes too much or to little—these and similar questions are important to consider. To such questions teachers should constantly seek answers. In terms of the answers they find they should revise the program, keeping careful check upon the effects the changes produce. Only through continuous attention to results can teachers determine whether the school justifies itself as society's chief agency for the education of children and youth.

The school should report the learning activities of its pupils both to the pupils themselves and to their parents. Pupils profit from a knowledge of the results of their efforts. Parents have a vested interest in the information the school may give about the learning activities and achievements of their children. The school meets an important obligation when it provides clear and understandable reports of progress. In addition, the school thereby also aids itself. A clear statement of what a pupil has accomplished and needs to do next, or of what he has failed to accomplish and needs to do to make up the deficiency, is the greatest single device of the school for stimulating effort on the pupil's part and helpful encouragement on the part of his parents.

The measurement of learning, then, is a double obligation of the school. The school owes it to itself and to its clientele to provide information about the work it seeks to foster. A program of measurement is a vital part of its total program. The purpose of the chapter is to describe the essential elements of the program of measurement of the school and to consider certain suggestions for making it serve its proper purposes. The chapter will develop two main topics—namely, (1) planning the measurement program, and (2) treating the results.

1. Planning the Measurement Program

Measures make objectives impressive. The objectives which teachers claim for a subject are often not the actual objectives that give direction to the activities of pupils. The ends of the course, as the teacher conceives them, frequently do not turn out to be the ends of the course as the student conceives them. From the teacher's convictions to the student's impressions, much is lost in transit.

How the objectives of a course expend themselves and waste away in their approach to the consciousness of the student may be made clear by illustration. In a given subject—history, let us say—the teacher sees the possibilities of training in collecting information, in arranging and organizing information, in making comparisons and contrasts, in drawing inferences, in generalizing, in testing conclusions, and the like. He, accordingly, sets up his course to make the most of these possibilities. He calls them to the attention of his students. He tries to emphasize their importance. He sets his students to work, at first in one activity, then in another, to gain the different types of training which he has in mind. His students, with more or less urging and guidance, perform the activities; but they perform them perfunctorily. They go through the motions, as it were, with their attention elsewhere. Frequently, they are inclined to look upon the activities as distractions from what they consider the real business of getting their lessons, for to them the real work of the school is the activity of taking information as it comes and going over and over it until they fix it in memory. They are not interested in drawing conclusions, for example, but in considering conclusions the book or the teacher has drawn for them and in committing the conclusions to memory. Their whole attitude often militates against the attainment of the major objectives of their course.

This unfavorable attitude of students is not incorrect, but merely incomplete. They have been impressed through past experience with one objective in the courses they pursue—namely, the objective of acquiring information. They have learned through past experience that it is upon this one objective that they will be tested in class recitation, in quizzes, and in examinations. They are certain of making a favorable impression upon their teachers if they can acquire and give back information. Moreover, they are quite certain that when the time for examination comes their teacher will test them upon what they can remember. This does not mean, to be sure, that the final examination will probably be confined to information alone. It will probably touch also upon comparisons, relations, inferences, and conclusions. Still, all signs point to the examination as one to tax the memory. It is not ability to compare, relate, infer, and conclude that their probable examination impresses upon them, but the ability to remember comparisons, relations, inferences, and conclusions which the course has called to their attention.

Students often study their teachers quite as much as they study their subjects. They are as much concerned with what their teachers demand as with what their subjects demand. It may be nearer the truth to say that they are more concerned. The teacher is present and available for study, whereas the subject is something remote and not yet in mind well enough to consider with much certainty. Besides, the subject for the student is much as the teacher makes it for him. What the teacher demands, despite all his illustrations and explanations and directions and despite all the sermons he preaches, is revealed by the type of questions he asks and the type of responses which satisfy him; in short, by the measures he sets up to gauge the student's work. Just as the runner trains his stride to the race he runs, so the student adjusts his efforts to the tests he has to meet. The teacher's demands are in the tests he sets up. His tests make impressive the objectives the student can see.

Statements of objectives should be clear. One of the reasons why the teacher makes his tests and examinations measures of the retention of information is that the gaining of information is an objective students can clearly understand. Students know that they must gain information in a course. They know that a course is valuable if it is informative. They know also that in order to learn they must become informed. Their course makes information available. It makes information the starting point and the basis of all the learning activities it sets up. It refers all its activities back to the information that is at hand as a check. What information is and how it may be gained are in no sense of the word matters of doubt in the mind of either teacher or student. The gaining of information is a clear objective. The measurement of the amount of information gained is a logical as well as an expected result.

The program of measurement should first consider the sequence of objectives, and then consider the tests to be used. The first question, then, is not, "What tests shall we use?" but, "What aims shall we have?" Teachers should formulate their various objectives, state them clearly, and arrange them in order of importance. When they have done this, they may properly proceed to the selection and the formulation of the measuring devices.

Each objective should have as complete a formulation and as clear a statement as it is possible to make. One reason is that students should understand the other objectives as well as they understand the objective of gaining information. Another reason is that good formulation and statement help to keep any one objective from having an emphasis that is out of proportion to its importance. Arranging the objectives in order of importance is merely a device for inducing a comparison of the values of the various objectives. The attempt to arrange them in order forces attention upon the relative weights which will be given to the various parts of the examination to be prepared. For example, in upper-grade arithmetic, neatness in written work may be one objective and ability to make clear distinctions between the three cases of percentage in practical situations may be another objective. The latter objective will perhaps head the list, and the former will be somewhere near the bottom. In preparing the examination in terms of these and other objectives, the teacher must make considerable effort to provide measures of the ability to distinguish the three cases of percentage, whereas he may leave the measure of neatness to a more or less incidental inspection of the student's papers. Certain other minor objectives may have such relative unimportance as to justify the omission of their measurement in the examinations.

Statements in terms of specific goals are helpful. The measurement program should be continuous, not merely one which needs attention at the conclusion of a course. To this end, the larger objectives may well be broken down into smaller specific goals, and each used as a guide in the preparation of an appropriate test.

The statement of a series of specific goals helps both teacher and student. It guides the teacher's instruction, and it gives direction to the student's progress in learning that is clear to the student and to his parents. To illustrate, suppose the objective of sixth-year arithmetic, "understanding square measure," is broken down into some such series of specific goals as the following: (1) can illustrate the meaning of an angle; (2) can distinguish angles of various sizes; (3) can illustrate and explain a right angle; (4) can draw right angles; (5) can define and draw a square; (6) can define, draw, and construct a square foot, (7) can measure the sizes of surfaces with the square foot; (8) can explain the rule for finding the area of a rectangle. At the outset, of course, the pupil will understand the series of goals no better than the statement of the larger objective. Nonetheless, as he begins the learning activities involved in each, the goal becomes clear. As he moves from goal to goal, their relations become clear.

As the pupil moves along, he should demonstrate his understanding. As soon as he has taken a given step, he should take the test on that step. Each step is a small one, and, as it is taken, it may become a tangible evidence of progress. For example, the series of steps may be written on a card bearing the pupil's name, and as he takes each step, the teacher may write alongside a check mark and his initials. The card may serve as a report of progress. If two or three or five of the eight steps indicated are checked, both the progress made and what remains to be done are indicated with clearness. The tangible record enlists the interest of the pupil and the interest of the parent in further progress.

When a student has progressed through a series of specific goals, he may have a comprehensive test covering all of them. This test, when announced, would not appear as an unknown species of torture, for the student would know in advance what the test would involve and what type of effort would be required of him to meet the test.

Measures should be true. With the objectives of a course clearly in mind and with their relative importance determined, the teacher can proceed to the preparation of the measures to use to test progress. The sequence of the problems is, first, what are the objectives? and, second, what are the appropriate measures?

For each objective, the teacher needs an appropriate measure of the progress the student has made. A measure which has proved appropriate and valuable for some other objective will not serve. In the field of physical measurement, for example, the examiner would use different measures for height, weight, temperature, blood pressure, and so on. He would not consider using the tape measure to provide an estimate of weight just because the tape measure has proved useful in getting a measure of height. Similarly, in the field of educational measurement, the teacher should use different measures for retention of information, ability to draw inferences, ability to apply major conclusions to new situations, laboratory technique, and so on. He should not consider using an information test to provide an estimate of how well the student can make inferences, for example, just because the information test has proved useful in measuring what the student can recall. The tape measure has one use. An information test has one use. Neither is good for different uses.

What we have just said seems so obviously true as to need neither time nor space to say it. Yet we need to remember that the test of retention is the prevailing type of test in use to measure progress in schoolwork. This test has its use, of course; and its use may sometimes extend beyond the objective of information to be learned. It may be, for example, that one of the objectives of a given course is to learn and remember certain major generalizations which the course develops. Testing the retention of these major generalizations is, then, a thing to consider. On the other hand, the ability to apply the generalizations to new situations may be another objective. Testing the ability to apply is a different thing to consider. The usual test of retention does not serve here.

In this connection, we need to keep in mind that an examination, or measurement of progress, may need to be more than a pencil-and-paper test. The pencil-and-paper test does not measure improvement in laboratory technique. It does not measure improvement in posture. It does not measure the development of attitudes and interests. It does not measure progress toward certain other objectives. Each objective must have its appropriate measuring instrument.

Measures should be reliable. When the teacher uses tests that are true, he can depend on the results they give. He may know at least that the results bear upon the quality or ability or attainment he wishes to measure, though he may not be fully certain as to their accuracy. For the sake of reliability, he must take special pains to secure results which are as accurate as possible.

A reliable test gives results which accord with the relative standing of the various persons who take the test. That is, those who are the best make the highest scores and those who are the poorest make the lowest scores. A reliable test will indicate when repeated the same relative rankings as it indicated in the first trial. It will give a dependable indication of the standings of those who take it.

The way to provide reliability in a test is to make each of its various items long enough and comprehensive enough to tax the ability of the student, and to produce results which represent his ability. His response to a single question, whether correct or not, is no reliable indication of his ability. His responses to ten questions give a better indication, and his responses to twenty questions give an indication that is better still. The number of misspelled words in a single written composition is no reliable indication of the writer's spelling ability. The number in ten compositions, or in twenty, is a dependable and fairly accurate indication. How the student responds in a single ten-minute test is relatively unimportant. How he responds in test after test is a matter of considerable importance.

What may the teacher do if he cannot depend on the results of a single test? He may repeat the test, or give it in another form, or test for the same thing in a different way. If the results remain closely the same, they indicate reliability. If the results differ widely, the teacher should continue his examination until he secures results that are fairly stable.

Measures should be objective. It is advantageous to use tests that give results or responses in countable points. Points which the examiner can count help to keep his subjective opinion from influencing the score he gives. Results in countable points make it possible for two or more persons to grade the responses and arrive at approximately the same score. They help to remove the influence of personal feeling which the examiner or teacher is bound to have in some degree. As a result, the student who takes the test gets what he makes.

The teacher does not need to limit his scoring in countable points to the commonly called "objective" tests—to the true-false, multiple-choice, and matching varieties. He may score other kinds of responses in countable points. Thus, when the pupil demonstrates how to "find a word" in the dictionary, the teacher may assign points according to the number of devices the pupil uses: attention to the initial letter of the word, one point; attention to second letter also, one point; use of guide words, one point; attention to diacritical and accent markings, one point; finding a definition, one point; choosing between definitions, one point; and so on. Or if the student answers a question about the effect of pressure on the volume of a gas, the teacher may assign points in terms of the number of things the student emphasizes in his recitation: one point, if he mentions only the direction of effect; two points, if he mentions both direction and amount of effect; three points, if he includes the constancy of temperature.

Summary. In planning examinations for the students in any grade or class, the teacher should give consideration to the following points:

1. Measures make objectives impressive.
2. Statements of objectives should be clear.
3. Statements in terms of specific goals are helpful.
4. Measures should be true.
5. Measures should be reliable.
6. Measures should be objective.

2. Treating the Results

The results of a test are relative, not absolute. When the teacher has prepared a test so that it is a valid, reliable, and objective measure of a clearly formulated objective of a subject, and when he has administered it with care, he next must interpret the results. He should do this because the results of his test are only relative in nature. They are not absolute. In the case of a given pupil, for example, the results may show what he can do, or indicate what he has accomplished, but they of themselves do not show whether the ability, or accomplishment, is good, average, or poor. Only as the teacher compares the results with those obtained from other pupils of the same age, grade, or class, can he properly decide what the results actually show.

If the teacher has used a standardized test—a test having standard norms which the responses of a large and representative group of pupils of the same age, grade, or class, have provided —he has at hand a standard by which he can gauge the pupil's results. Comparison shows that the pupil either has reached the standard set by pupils of his own age, grade, or class, or falls below it or surpasses it. On the other hand, if the teacher has used a test of his own preparation and has not tried it in other classes, he will have to compare the results in the case of a given pupil with the class scores, and make his judgment accordingly. In this case, he will need to reduce the scores of the whole class to a form that he can easily apprehend and use as a basis of comparison. To this end, he should do the following: (1) reduce the test results to a compact form; (2) reduce the test results to single measures; (3) determine individual evaluations as comparisons with the group scores.

Test results should appear in compact form. The scores of a group should be brought together into a form that is compact enough or small enough for the eye to take them all in at once, as it were. At the same time the form should not be so compact as appreciably to disturb accuracy. Such a compact form is the frequency distribution.

To illustrate the making of the frequency distribution, let us take the scores of sixty-four pupils in a sixth grade on a test in the fundamentals of arithmetic. Omitting the pupils' names, the scores as they appeared opposite the names in an alphabetic list are as follows: 102, 160, 184, 76, 58, 83, 100, 149, 137, 171, 49, 131, 155, 98, 120, 89, 71, 111, 218, 168, 139, 115, 91, 74, 198, 220, 106, 132, 191, 107, 78, 62, 135, 151, 92, 205, 135, 119, 124, 239, 140, 96, 123, 87, 111, 179, 53, 105, 228, 163, 85, 140, 169, 125, 182, 38, 130, 165, 128, 137, 147, 162, 136, 85. The problem is to classify the scores into a reasonable number of groups—reasonable in the sense that there are not too many for ready apprehension and not too few for accuracy.

Since the range between the lowest score of 38 and the highest score of 239 is just over 200, classes with a range, or interval, of 25 suggest themselves. Such a range, or class interval, will provide approximately 8 classes. A range of 50 would provide too few, and a range of 10 or 5 would provide too many. Table 2 shows the making of a frequency distribution with class intervals of 25. The class intervals are in the column at the left. To the right are the tallies of the scores in the class intervals in which they belong. Table 3 is the same as Table 2 except that it represents the tallies by the appropriate numerals.

Table 2. Illustration of the making of a frequency distribution

Scores	*Number of Pupils*
225–249	||
200–224	|||
175–199	𝍸
150–174	𝍸 ||||
125–149	𝍸 𝍸 𝍸
100–124	𝍸 𝍸 ||
75–99	𝍸 𝍸 |
50–74	𝍸
25–49	||

Table 3. Illustration of a frequency distribution

Scores	*Number of Pupils*
225–249	2
200–224	3
175–199	5
150–174	9
125–149	15
100–124	12
75–99	11
50–74	5
25–49	2

Arranging the numbers of scores in the class intervals of a frequency distribution sacrifices a certain degree of accuracy for ease of observation, computation, and interpretation. When a person makes a frequency distribution, he must base it on the assumption that the scores within any given class interval are evenly distributed, and that the average of the scores within any given class interval is the value shown by the mid-point of the class interval.

Test results should reduce to single measures. There are two types of single measures which describe all the measures of a group—namely, measures of central tendency and measures of variability. The common measures of central tendency are the *mean* and the *median.* The common measures of variability are the *range of the middle fifty per cent,* the *quartile deviation,* the *standard deviation,* and the *average deviation.* The former are indicated as *points* on a scale and the latter as *distances* on a scale.

The mean is the point on a scale of measures at which the deviations from it balance. It is the value all the measures would have if their values were the same. It is the common *average.* To compute it, we assume a mean at the mid-point of the class interval in which it appears that the true mean exists. Next, we compute the distance—first in class intervals and then in points—in which the assumed mean is in error. Finally, we make the correction that will remove the error.

The median is the point on a scale of measures below which are exactly half of the measures. To find it, we start at the bottom of the scale and count out half of the measures as we move up the scale. In the class interval in which we complete the count, we move up the proportional distance to give the remaining measures we need to make a half of the total.

The first quartile (Q_1) is the point below which are one-fourth of the measures. The third quartile (Q_3) is the point below which are three-fourths of the measures. We find both the way we find the median—that is, we count out the desired number of measures from the bottom of the scale.

The range of the middle fifty per cent of the scores is the distance between Q_1 and Q_3. The quartile deviation (Q) is half the distance between Q_1 and Q_3.

The standard deviation is the distance on the scale which when measured in either direction from the mean includes approximately one-third of the measures. Thus, from one standard deviation below to one standard deviation above the mean, two-thirds are included. It is the square root of the average of the squares of the deviations from the mean. We compute it in terms of the squares of the deviations in class intervals from an assumed mean, making the necessary correction, and, finally, changing the answers in class intervals to points.

The average deviation is the average of the deviations from the mean, without regard to signs. We compute it in terms of deviations in class intervals from a convenient assumed mean. In consequence, a number of the measures fall short of their true deviations (N short), and the deviations of another number are computed as more than they actually are (N long). We correct accordingly in order to find the average of the true deviations.

Table 4 illustrates the computations to which we have referred. The next topic will mention some uses of these computations.

We may now describe the scores of the group of sixty-four sixth-grade pupils in the fundamentals of arithmetic in few, but well-understood, terms. The average is 129. The range of the middle fifty per cent is from 95 to 158. The highest sixth of the pupils made scores higher than 175. The lowest sixth made scores lower than 83.

Table 4. Illustration of the computation of the mean, median, quartiles, quartile deviation, standard deviation, and average deviation.

(1)	(2)	(3)	(4)	(5)
SCORES	f	d	fd	fd^2
225–249	2	4	8	32
200–224	3	3	9	27
175–199	5	2	10	20
150–174	9	1	9	9
125–149	15	0	0	0
100–124	12	−1	−12	12
75–99	11	−2	−22	44
50–74	5	−3	−15	45
25–49	2	−4	−8	32
TOTALS	64 (N)		−21 (Σfd)	221 (Σfd^2)

Explanation of symbols in table: f, frequency (number) of cases in each class interval; d, deviation in number of class intervals from the assumed mean (mid-point of the 125–149 class interval); fd, the total deviations (f × d) in each class interval; fd^2, the total of the squares of the deviations ($f \times d^2$) in each class interval; Σ sum; Σfd, the sum of the deviations; Σfd^2, the sum of the squares of the deviations.

I. Mean = assumed mean + $\left(\frac{\Sigma fd}{N} \times \text{size of class interval}\right)$

$$M = 137.5 + \left(\frac{-21}{64} \times 25\right) = 137.5 - 8.2 = 129$$

(in nearest whole point)

(1) We assume the mean at the mid-point of the 125–149 class interval; (2) we record the deviations in class intervals above and below the assumed mean; (3) we record the total deviations in each class interval; (4) we find their sum, which shows that the deviations above and below our assumed mean do not balance and that we must lower our assumed mean to make it the correct mean; (5) we find the average of (4), which is our correction; (6) we apply our correction.

II. Median = bottom point of interval containing median + $\left(\frac{\text{number needed}}{\text{number in interval}} \times \text{size of class interval}\right)$

$$Md = 125 + \left(\frac{2}{15} \times 25\right) = 125 + 3.3 = 128$$

(in nearest whole point)

(1) We find one-half of our number of cases; (2) we start at the bottom of our scale to count up to include the half, and count 30 to point 125; (3) we need 2 more to complete our count, so we must move up in our scale $\frac{2}{15}$ of the length of the class interval; (4) we add this distance to 125.

III. First Quartile = bottom point of interval containing it + $\left(\frac{\text{number needed}}{\text{number in interval}} \times \text{size of class interval}\right)$

$$Q_1 = 75 + \left(\frac{9}{11} \times 25\right) = 75 + 20.4 = 95$$

(in nearest whole point)

(1) We find one-fourth of our number of cases; we proceed as in steps (2), (3), and (4) in II, above.

IV. Third Quartile = bottom point of interval containing it + $\left(\frac{\text{number needed}}{\text{number in interval}} \times \text{size of class interval}\right)$

$$Q_3 = 150 + \left(\frac{3}{9} \times 25\right) = 150 + 8.3 = 158$$

(in nearest whole point)

(1) We find three-fourths of our number of cases; we proceed as in steps (2), (3), and (4) in II, above.

V. Quartile Deviation = $\frac{1}{2}$ (Third Quartile − First Quartile)
$Q = \frac{1}{2}(158.3 - 95.4) = 31$ (in nearest whole point)

VI. Standard Deviation = $\left(\sqrt{\frac{\Sigma fd^2}{N} - \left(\frac{\Sigma fd}{N}\right)^2}\right) \times$ size of class interval

$$\text{S. D.} = \left(\sqrt{\frac{221}{64} - \left(\frac{-21}{64}\right)^2}\right) \times 25$$

$$= (\sqrt{3.4531 - .1089}) \times 25$$

$$= 46 \text{ (in nearest whole point)}$$

(1) We proceed as in steps (1), (2), (3), (4), and (5) in I, above

(2) We square 5 in I, above. $\left(\frac{\Sigma fd}{N}\right)^2$ is the correction applicable to the average of the squared deviations from the assumed mean, i.e., to (4) below.
(3) We square the deviations from the assumed mean, Σfd^2.
(4) We find the average of (3).
(5) We subtract (2) from (4) and extract the square root.
(6) We multiply (5) by the point size of the class interval.

VII. Average Deviation = $\left(\frac{\Sigma fd}{N} \times \text{size of class interval}\right) + \left(\frac{(\text{N short} - \text{N long}) \times \text{point difference between assumed and true means}}{N}\right)$

$$\text{A. D.} = \left(\frac{93}{64} \times 25\right) + \left(\frac{(34 - 30) \times 8.2)}{64}\right) = 37 \text{ (in nearest whole point)}$$

(1) We proceed as in steps (1), (2), and (3) in I, above.

(2) We find the sum of the total deviations in each class interval, disregarding + and — signs.

(3) We find the average (2) and multiply by the point size of the class interval.

(4) We subtract from the number of cases that fall short of the true mean the number that fall long.

(5) We multiply (4) by the point difference between the assumed and true means.

(6) We find the average of (5) and add to (3).

Individual evaluations should be comparisons with the group scores. Let us evaluate the first four scores given—of pupils A, B, C, and D, let us say. A's score of 102 places him below the average and among the lower pupils of the third fourth. B's score of 160 places him on the lower edge of the best fourth of the group. C's score of 184 places him among the best sixth; and D's score of 76 places him at the upper level of the lowest sixth of the group.

Another method of evaluation is in terms of letter grades: A, B, C, D, and F. The letter grade indicates the pupil's standing in relation to his group. When we derive it from the results of a group test, as is frequently the practice, we should derive it as an expression of the pupil's standing in relation to the standing of the group, as expressed by a *measure of the central tendency* and by a *measure of the variability* of the group scores.

Following is a useful and correct method of translating test scores into letter grades. Reference to the distribution of the test scores of the sixty-four pupils illustrates the steps.

(1) Find the average (mean) of the group scores. (129.3)

(2) Find the average deviation of the group scores. (36.8)

(3) Add two times the average deviation to the mean. Use this value as the lower limit of the A's. (203)

(4) Add two-thirds of the average deviation to the mean. Use this value as the lower limit of the B's. (154)

(5) Subtract two-thirds of the average deviation from the mean. Use this value as the lower limit of the C's. (105)

(6) Subtract two times the average deviation from the mean. Use this value as the lower limit of the D's. (56)

(7) Use the values below the lower limit of the D's to indicate the F's. (55 and below)

The test scores of the sixty-four pupils translate into letter grades, as shown:

LETTER GRADE	LIMITS	NUMBER OF PUPILS
A	203 *and above*	5
B	154–202, *inclusive*	13
C	105–153, *inclusive*	26
D	56–104, *inclusive*	17
F	55 *and below*	3

The following sample problem and solution (Table 5) illustrate the method of translating scores into letter grades when the group tested is of the usual class size. Each letter grade merely represents high or ordinary or low performance relative to the average performance of the whole class in this test alone.

Table 5. Sample problem and solution based on the test scores of 42 students in a class in Educational Psychology.

Scores		*Deviations*
57	(57–50)	7
34	(50–34)	16
63	(63–50)	7
46	(50–46)	4
60		10
47		3
55		5
35		15
48		2
77		27
57		7
50		0
40		10
49		1
47		3
69		19

52	2	Average	50
45	5	Two times average deviation	16 (add)
58	8	Lower limit of A's	66
41	9		
74	24		
43	7	Average	50
52	2	Two-thirds average deviation	5 (add)
61	11	Lower limit of B's	55
47	3		
46	4		
72	22	Average	50
62	12	Two-thirds average deviation	5 (subtract)
50	0	Lower limit of C's	45
45	5		
42	8		
48	2	Average	50
44	6	Two times average deviation	16 (subtract)
48	2	Lower limit of D's	34
59	9		
41	9		
30	20		
54	4		
32	18		
47	3		
43	7		
39	11		

2109 (Sum of scores) 349 (Sum of deviations)

$2109 \div 42 = 50$ (Average score)

$349 \div 42 = 8$ (Average deviation)

Letter Grade	*Limits*	*Number of Students*
A	66 and above	4
B	55–65, inclusive	9
C	45–54, inclusive	17
D	34–44, inclusive	10
F	33 and below	2

Summary. The results of a test are relative. They indicate the standings or achievements of individuals or of groups in relation to appropriate standards. A pupil in the fourth grade is a good or poor reader, for example, according to the standard set by pupils in the fourth grade, not by pupils in the first grade or in the sixth grade. To determine whether a student in the high school is good or poor in chemistry, we must compare his achievement with the standard achievement of high-school students, not of college students or graduate students.

When we have no such comparable standards to use in evaluating the results of a test, we must interpret them according to their relations to the group results. To aid interpretation, we should (1) reduce the test results to compact form; (2) reduce the test results to single measures; (3) determine individual evaluations as comparisons with the group scores.

Chapter 22

Individual Similarities and Differences

Purpose of the chapter. A common chapter in discussions of education is the one which treats the topic of individual differences, their origin, their causes, and their significance. So many have written so much about the subject, especially during recent years, as to convey the idea that similarities among individuals are relatively unimportant. They leave the impression, perhaps unintentionally, that similarities may be much less significant for education than are differences. The purpose of the present chapter is to introduce the subjects of similarities and differences so that each appears as the complement of the other, and thus to advance the suggestion that consideration of the one is incomplete without consideration of the other. The chapter seeks to develop two main topics—namely, (1) the incidence of similarities and differences, and (2) the significance of similarities and differences.

1. The Incidence of Similarities and Differences

The traits of individuals are both similar and different. No two persons are exactly alike. They do not have the same experiences. They do not view the same situation from the same angle simultaneously. They are not in the same place at the same time. Even identical twins are different—in small degree, of course

—in appearance, in attitude, in point of view, and in mode of responding to situations.

On the other hand, though the elements composing the experiences of different individuals are not the same, the general pattern of their experiences in a given social group, or stratum of society, is singularly common. They have a common language. They pursue similar modes of thinking. They live among the influences of common group standards of behavior. They are the products of the group culture that impinges upon them in much the same way. In consequence, they follow the same styles of dress and of behavior. They look alike, act alike, think alike, and feel alike. In any given social group, large or small, certain ideas and ideals in slightly varying degrees are the common possessions of all.

Similar responses and similar attitudes among the individuals of a group are the normal expectation. In a given classroom, first grade or twelfth, we expect the pupils with similar backgrounds of preparation and achievement to respond in a learning situation in much the same way. In the first grade, most pupils respond alike, or nearly so, to the object lessons the teacher presents. They have a somewhat common meaning for the spoken word *dog*, for example, and they learn with somewhat equal facility to attach this meaning to the printed word *dog*. In the twelfth grade, despite their varying individual interests, most students respond alike, or nearly so, to the social situations in which they find themselves. It is a cause for remark and wonder when a pupil fails to respond much as his group responds, or when he responds in a way that is different.

Different responses and different attitudes among the individuals of a group are also the normal expectation. In a given classroom, first grade or twelfth, we expect the pupils with different backgrounds of preparation and achievement to respond differently in a learning situation. We expect that some will grasp a point at its first presentation or illustration, and that others will require several presentations and illustrations before the point begins to become clear.

The differences that we normally expect among the members of a group are small in amount. Slight differences do not cause remark. It is only wide differences which strike the attention. For example, we give more than a passing glance at the man who is seven feet tall and at the man who is under five feet. These heights are differences from the norm. They are unusual, hence striking. The differences which strike the attention are the uncommon ones, not the common ones.

Test scores show similarities and differences. The test scores on any achievement or trait of the members of a school group reveal closely similar results among the many and widely varying results among the relatively few. Figure 14 shows in graphic form the distribution of the scores of the sixty-four sixth-grade pupils on the fundamentals of arithmetic which was presented in Table 3. The horizontal axis represents the scores, scaled in class intervals of twenty-five points, and the vertical axis represents the numbers of pupils making the scores the class intervals indicate. The figure shows a large proportion of the scores piled at the middle points of the scale, and decreasing proportions to the right and left. That is, the figure represents many pupils as having

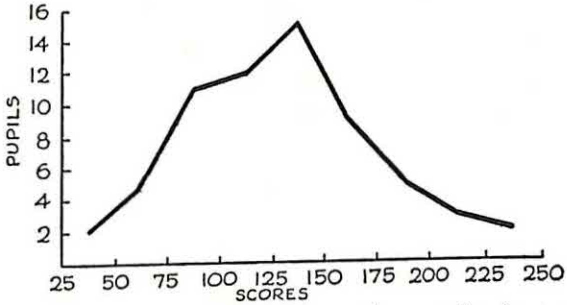


FIG. 14: *The scores of 64 sixth-grade pupils in a test in the fundamentals of arithmetic*

made somewhat similar scores, and fewer and fewer as having made higher and higher or lower and lower scores.

Figure 15 shows the scores of 261 sixth-grade pupils in the same test. This figure differs from Figure 14 in the respect that the numbers of pupils it indicates as having scores either higher or lower than the average recede with greater regularity. The curve showing the scores of the larger number of pupils has fewer "breaks"; it is less "erratic"; it is a more "regular" curve. This we should expect because the larger group of 261 is probably more representative of sixth-grade pupils than is the smaller group of 64.

Measures of human traits show similarities and differences. Whenever we measure human traits and arrange the measures in order from least to greatest, we reveal the same general facts of similarity and difference that Figures 14 and 15 so strikingly show.

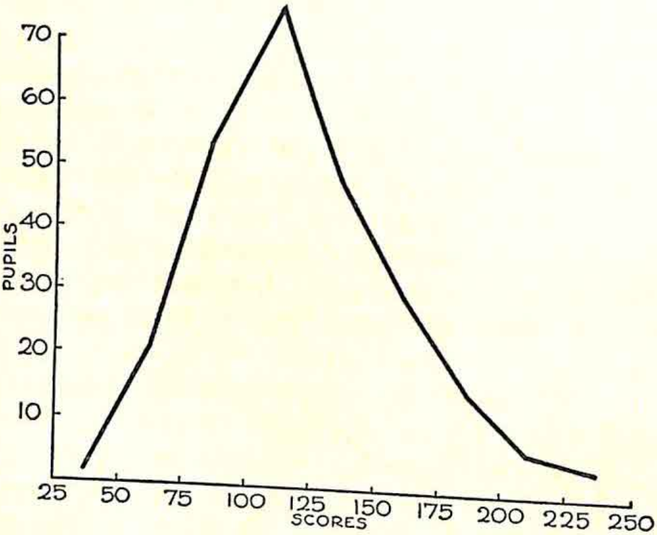


FIG. 15: *The scores of 261 sixth-grade pupils in a test in the fundamentals of arithmetic*

We provide a graphic view of the many measures that are closely similar, and of the few that are widely different. We get a vivid portrayal of the facts that most measures concentrate about the average; that many measures vary from the average in small amounts; and that fewer and fewer measures vary from the average in larger and larger amounts.

Figure 16 represents the distribution of the heights of 8,585 men born in the British Isles. The group is a large one, and may be said to be, as regards height, highly "representative" of all the men in the British Isles when the measures were taken. The measures shown are physical measures, and are much more accurate and reliable than are measures of school achievement. We may note that the curve is more closely symmetrical than are the curves in Figures 14 and 15, which represent the achievements of small groups.

The normal curve shows the distribution of expected similarities and differences. As larger and larger groups are included in the measurement of a trait, ability, or achievement, the curve which represents the distribution of the measures is more and more a symmetrical curve. Complete symmetry is never achieved, but always approximated. The symmetrical curve represents a theoretical distribution of measures, never an actual one. It is a kind of standard of comparison to which we may refer the curves of actual distributions. Curves of actual distributions become related to each other in appearance and characteristics, because they all relate more or less closely to the symmetrical curve.

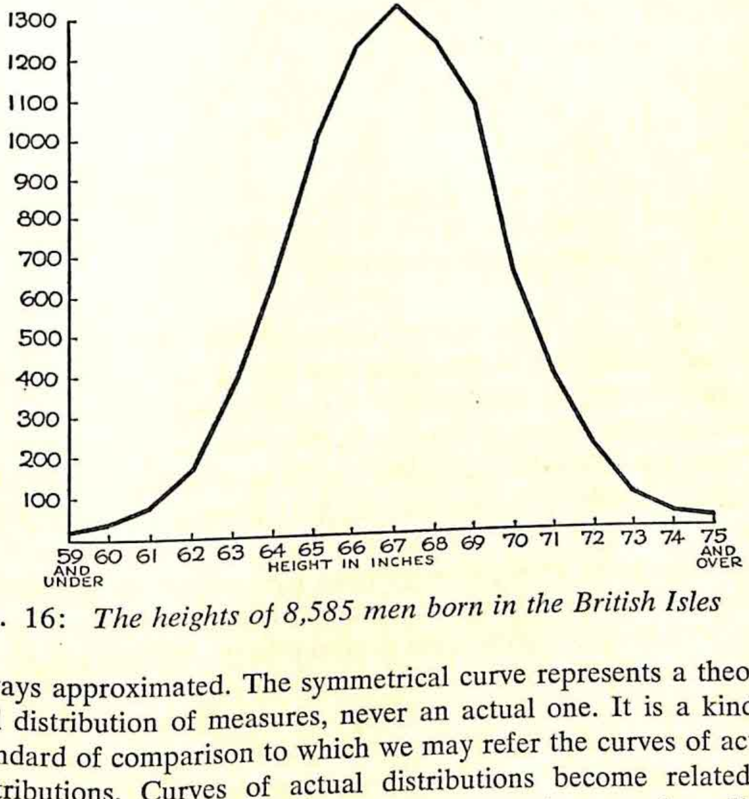


FIG. 16: *The heights of 8,585 men born in the British Isles*

The symmetrical curve shows normal expectation of the distribution of traits, abilities, or achievements among a large and representative group. It indicates the probabilities of what any given actual distribution will be. It is a kind of summation of experience with the distributions of many measurements.

From the general characteristics of the distributions resulting from many measurements, we may determine the properties of the symmetrical curve. When we plot these properties to scale, the "normal curve," or the "probability curve," or the "curve of normal expectation" results, as Figure 17 indicates.

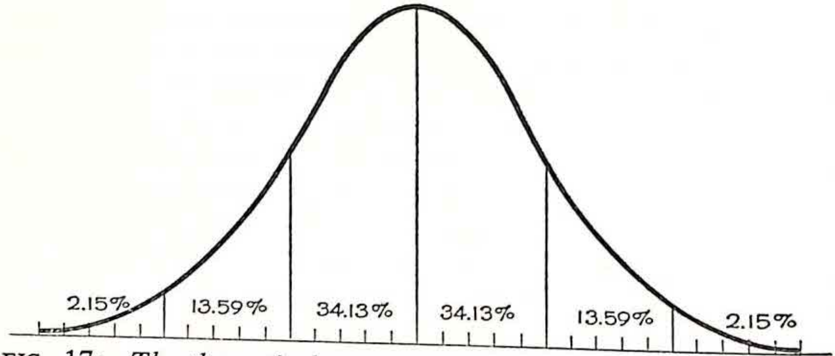


FIG. 17: *The theoretical normal curve*

In Figure 17 the normal curve cuts off arbitrarily at three times the standard deviation on either side of the mean. We may note that more than two-thirds of all the measures the curve represents are within minus one standard deviation and plus one standard deviation from the mean. We may note also that only a small percentage of the measures are at the extremes of the distribution.

Figure 18 shows a comparison between an actual distribution of measures and the theoretical normal distribution.

Summary. With respect to any trait, ability, or achievement, the individuals who group together on any common basis—such as age, occupation, nationality, years in school, and the like—are more closely similar than they are widely different. The large majority differ from each other in small degree, whereas differences in any considerable degree exist only among the relatively few. These facts come to attention in the presentation of the following points:

1. The traits of individuals are both similar and different.
2. Test scores show similarities and differences.
3. Measures of human traits show similarities and differences.
4. The normal curve shows the distribution of expected similarities and differences.

2. The Significance of Similarities and Differences

The promotion of learning among pupils of average abilities and attainments is the teacher's major responsibility. By the sheer weight of numbers the pupils of so-called "average" attainment create the greatest demands upon the teacher's time, energy, and resources. They are at once the bulk of the teacher's class and the group which determines its general and central characteristics. The stage of their ability and achievement is the stage of the ability and achievement of the larger group of which they are a part. As they move ahead, so does the class. As they mark time or fail to progress, so does the class. To teach his class the teacher must first teach his "middle" group.

The pupils of so-called "average" attainment impress the teacher. Their numerical superiority takes his attention. As a con-

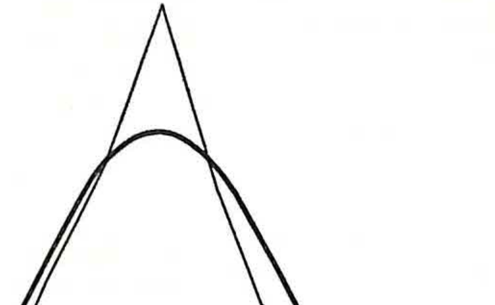


FIG. 18: *Actual distribution of the point-difference scores of 375 fifth- and sixth-grade pupils in a test in problem-solving in arithmetic, compared with the corresponding normal distribution for the same total number of cases and the same standard deviation*

sequence, he shapes his course, his methods of instruction, his directions, his assignments, in terms of their abilities and interests, or in terms of his conception of their abilities and interests. He plans and manages the course of study chiefly for them. The curriculum of the school is in a very real sense the curriculum which in theory at least best fits the "average" pupils of the school. It is an expression, however conceived and however administered, of the teacher's obligation to the large middle group which constitutes the bulk of his class.

Pupils at the extremes provoke study. Frequently the teacher is so overwhelmed with the weight of numbers of the middle group of his class as to give them not merely the major part, but almost the whole, of his attention. Their abilities and attainments crowd together at a middle stage of development, and they turn his attention in the same general direction. Their location is at the point of mediocrity. Mediocrity of ability and attainment thus makes itself impressive as a standard. It is at this point that the teacher needs to break away in his thinking and planning from his large middle group in order to consider the pupils at the extremes.

The pupils at the extremes of the distribution of a class, those of low ability and attainment and those of high ability and attainment, constitute a problem. They do not fit in. They are not consistent. They stand out in sharp contrast, not only from each other, but also from the large middle group. They do not fit into the planning for the middle group, and the plans for the middle group do not fit them. At once they pose the problem of how to adapt the instructional program that is planned for the middle group to fit their special needs. It would seem that no teacher could give his attention to the mere presence of such pupils in his class without being provoked to a consideration of the problem which they present.

Yet it turns out, and all too frequently, that the teacher gives little thought to the solution of the problem. His limitations, or the limitations of his energy and resources, often impress him more than does the magnitude of the special problem his exceptional pupils present. He feels that if he should seek to solve the problem, he might neglect the large middle group of his pupils. He considers that the middle group is the bulk of his class, and that the pupils at the extremes are relatively few in numbers. As a consequence, he concludes that the benefits of a possible solution would not extend to a number large enough to justify the labor that would be involved in arriving at a solution. He forgets that there may be more involved in a consideration of his special pupils than the special problem which their special abilities and attainments present.

The pupils at the extremes of the distribution of a class suggest more than a problem which pertains to themselves; they also suggest the possibility of a solution for the problem which the middle group presents. They take the attention of the teacher away from the mediocrity of the middle group, and offer the suggestion, if the teacher will look for it, of ways and means of removing the middle group from some of its mediocrity. When the teacher begins to think of the pupils of low achievement and to consider the explanation for the position they occupy with respect to the rest of his class, he is apt to come upon a suggestion for keeping the pupils of his middle group from slipping down the scale. When he discovers some of the reasons why his better pupils have succeeded in the achievements they have made, he has at hand a suggestion for helping the pupils of his middle group to proceed up the scale. The pupils at the extremes of the distribution of his class are not just an added burden to the teacher; they are also a means of helping him to assume his major responsibilities.

Negative suggestions may come from the study of slow pupils. When our study of slow pupils extends far enough, we become aware of the causes of some of the difficulties which made them slow. Some are poor readers, for example, because they have not learned effective methods of recognizing words, or because they read words as words and not as symbols of ideas, or because they possess a small vocabulary of meanings, or because of other deficiencies in their earlier instruction. Some are poor in arithmetic, for example, because they have learned their arithmetic merely as a set of skills rather than as a system of thinking, or because they are wholly unskillful in such computational procedures as have been called to their attention. Some are poor in geography, for example, because they have never learned to look for directions and distances on maps, or because their geographic information either is scanty and inexact or has centered in itself and has not led to inferences ability shall gain the information, practice the method of work and thinking, develop the idea, or improve the skill which it is the purpose of the lesson, or series of lessons, to teach.

Outwardly, in consequence, the teacher's purpose, as his assignment and guidance indicate it, is the same for all, though inwardly the results may differ. The teacher calls attention to the distinguishing features of words that appear similar and has all pupils point out the distinctions. The teacher insists that each pupil shall close his **a** at the top and bring its tail down to the line so the resulting **a** will not resemble the **u** or the **o**. The teacher has each pupil find his own answer to the question, "How much is four nines?" by resolving the nines into three tens and six. The teacher points out the steps of proof to all pupils, has all study the steps and trace the steps in demonstration after demonstration, and discusses with all the presence and absence of the steps in good proof and bad, respectively. The teacher has all pupils practice to perform their parts in band or orchestra, though each may play a different instrument. In every case, the teacher tries in varying ways to get each pupil to do as well as he is able. Differences in resulting achievement are not a problem, but an expected fact.

A teacher of sixth-grade arithmetic had planned an extensive review to start the year's work for his pupils. On the opening day he discovered that several were badly in need of a review, and that certain others needed at least some refreshment exercises at various spots in their earlier work. He also noted that a few seemed to be able to move on into new work without benefit of review.

The review began with the arithmetic of the beginning grades; but for all the pupils it was a new view and a different view from any they had experienced. The pupils in considering simple adding, for example, noted what a person actually does when he counts two amounts together, how he unites them into a single group in some cases, and into a compounded group, a teen, in others. They considered what a person must attend to when he divides, and understands his dividing—the whole original amount; the equality of the groups, or parts, as the case may be; and the resulting number of groups, or number in each group, respectively—and each learned how to demonstrate the procedure of dividing in each case. They gave renewed, or largely new, attention to the use of the numerals, each by itself and in different positions with others and with zero, to represent the single groups and compounded groups, respectively. From start to finish, the pupils paid attention to how a person works and thinks when he performs the various processes of arithmetic that were included in the review. At the review's end, all the pupils had profited, whatever may have been their classification at the beginning, and all were eager to try the new work that was ahead. No two pupils had profited in exactly the same way. At least, the teacher could not say they had, and he did not make this his problem.

A teacher of twelfth-grade literature undertook as his chief purpose for the year the teaching of a way to study a selection and thereby to learn to read it with ease and understanding. Day after day, especially at the outset, he demonstrated three steps in studying—how to read for a bird's-eye view of the whole selection, how to pick out and study details, and how to work the learned details into a final reading—and guided his students, all his students, in taking the steps. He helped his students in varied amounts and in various ways, and he was persistent in his effort to get each to pursue the steps he had laid out. As a result, all his students learned to pursue the three steps and all his students learned some literature. Here again, the teacher's problem was not how he should classify his students, but how he should instruct them. His plan of instruction was much the same for all, though his adaptations varied from day to day and from pupil to pupil.

We may conclude our discussion with the statement that the problem the special pupil, whether rapid or slow, presents is in the main not one of providing special lessons, but, instead, one of making special adjustments and adaptations in the teaching of common lessons. Shall we not enrich the learning program of the superior pupil? The pupil we call the "slow learner" seems in greater need of an enriched program; besides, the superior pupil who learns some common lessons in a superior way can provide his own, or much of it. Shall we not give the superior pupil extra lessons to occupy his time? We must on occasion slow him down to a contemplation of details and how he may relate them so that his learning will be less superficial. Shall we not rest content when the slow learner grasps the routines and the surface features of his lessons? Often, when we get the slow learner to work something through for himself, his resulting appreciation of personal achievement transcends any sense of value the superior pupil can gain. The lessons we assign the superior pupil we should extend to the slow; the lessons that are valuable for the majority middle group are needed by all. The procedure is by no means learning in lockstep, for the results in every case are personal and individual.

Summary. The teacher has at least three groups of pupils to instruct: a large middle group, and two smaller groups at the extremes of the distribution of his class. His problem is not one of segregation for differentiated instruction, but rather one of adjusting instruction so that all may learn in common, and each to the best of his ability, the important lessons the school may teach.

The significance of the similarities and differences among pupils has been indicated in the presentation of the following points:

1. The promotion of learning among pupils of average abilities and attainments is the teacher's major responsibility.
2. Pupils at the extremes provoke study.
3. Negative suggestions may come from the study of slow pupils.
4. Positive suggestions may come from the study of superior pupils.
5. Adapting instruction for special pupils is a special problem.
6. Providing instruction for all pupils is an everyday problem.

Chapter 23

Levels of Learning Activity

Purpose of the chapter. At many points the discussions which precede have carried the suggestion that the learning of the same thing by different pupils is not always the same and that widely varying reactions of meaning may derive from similar outward stimulations. The present chapter brings the suggestion to a head by calling it explicitly to attention.

Differences in learning are familiar outcomes of schoolwork. As students of education or as practicing teachers, we evidence our recognition of differences in learning in the contrasting terms we employ as means of designation. Through the terms we use, we distinguish memory from understanding, skill from meaning, knowledge from application, and habit from judgment. Through the use of different designating terms, we emphasize the attention we give to the unlike features in the learning achievements of pupils.

The teacher brings about variations in learning by conducting different types of work. For a given purpose, the teacher conducts a practice exercise or a drill lesson; and for another purpose, he conducts a lesson in problem-solving. At one time, he guides his pupils in collecting information; and at another time, he indicates a way to organize information. Today, he may assist his pupils to arrive at a conclusion; and tomorrow, he may shape his suggestions so as to stimulate a questioning attitude toward the conclusion or a search for its proof. For each type of lesson the teacher has a special name. Sometimes, unfortunately, his attention to terminology is out of proportion to his attention to the real aims and purposes of the various lessons he conducts. Nonetheless, his employment of different terms is an indication that the differences between learning activities and between the products of learning activities are objects of his attention.

Courses of study often classify the various outcomes of learning. The following distinctions are in the usual pattern:

1. Habits and skills
2. Knowledge and information
3. Meanings and applications
4. Points of view and appreciations
5. Ideas and principles
6. Ideals and standards

Differences in learning activities are frequently neglected. The recognition of differences in learning does not guarantee to them consistent attention in practice. Both in the work of the schools and in the principles of procedure which give it form and direction, there exists a widespread neglect of such differences.

An earlier discussion has pointed out that the usual type of examination, in its emphasis upon the retention of information, serves to impress upon students one and only one way of preparing their lessons. Whatever the amount of lip service the teacher may give to inference, generalization, the solution of problems, and the development of understanding, the student, nevertheless, has learned from experience that his success is apt to be the measure of the amount of material he can remember. In consequence, the student gives little more than passing attention to other possible outcomes the teacher may mention, and bends his energy to the task of remembering as much as he can, or as much as he deems will gain the teacher's final approval. Thereby the school succeeds in emphasizing a primitive, yet important, type of learning activity, frequently to the neglect of later, more advanced ones and ultimately more important ones.

The general character of the primitive types of learning, such as memorizing, developing skill, and forming habits, draws attention away from the more advanced types. The former are the more objective. We can study them with the greater ease. We can observe them in action, as it were. Because of their objectivity and relative simplicity, they have been the subject of more extensive and more elaborate studies than have the types which ultimately are the more valuable. Out of such studies have come the so-called "laws of learning"—the law of effect, the law of repetition, and the like. Though these laws derive from specific types of learning, we often give them an application that is general. Since we are accustomed to consider a law as a principle of general applicability, we are inclined to treat a law of learning without regard to its relation to its specific source and to consider it as a principle that applies to all learning activity. To illustrate, we note the necessity of repetitive practice in developing a skill. We generalize our observation and conclude that practice is an essential in developing any skill. We transfer our attention from the application of repetition to the activity of repetition, and we have in result a guiding principle of procedure in all learning. As a consequence, we turn much of our schoolwork from the development of ideas and methods of thinking, and restrict its outcomes to the results which derive from the drill method of instruction.

Differences in effort characterize the different stages of learning. The different stages of a learning activity seem to arouse different amounts of effort. During the beginning steps in developing a skill, for example, or in securing and retaining information, a little effort seems to go a long way. The learner seems to gain a great amount of results in return for his efforts. He makes good progress, and his progress encourages him to continue to put forth effort. Yet soon his task becomes less simple than it was at first. It seems to require more effort to make less progress. The learner is easily discouraged. He finds the novelty of his task wearing off. He holds himself to the task at hand with difficulty. He loses sight of values which may accrue from the expenditure of effort. He has reached a plateau in learning, a point where he can see no immediate results. At this point the learner needs encouragement. He needs to be held to his task by the imposition of external requirement of one sort or another.

Later, when the learner has mastered the skill or acquired the information which he had set out to learn, he may put the skill to some use or point up his information toward an inference or conclusion which seems appropriate. When he does, there follows a gain which far transcends anything approached in the results of his earlier efforts. To illustrate, the young musician, who has encountered much tedium in practicing his scales, and has had to be held to his practice exercises by various external requirements, now finds in the employment of his skill a type of result which makes him disregard effort. Formerly, a half hour of practice seemed to extend over the space of hours. Now a half hour of playing on his instrument seems to cover only a few minutes. His earlier practice seemed very effortful, though effort was frequently dissipated; his later practice seems effortless, though he brings effort to bear in respectable amount.

We have a further illustration in the contrasting amounts of effort the learner puts forth when he is acquiring information without purpose and when he is acquiring information in terms of an idea he has previously gained. In the former instance, the learner must drive himself or a more responsible person must provide the drive. In the latter instance, his idea gives purpose and drive. The mere gaining of information is quite a different matter from the gaining of information to make clear or to establish or to develop an idea that is in the learner's mind. In other words, just as soon as the information one is getting begins to take on a meaning of its own and to lead somewhere, the whole procedure of gaining information seems to become a changed activity. The learner works with greater drive. He puts forth more effort in a less effortful way. He does not dissipate his effort, but makes his effort count.

Differences in quality of attention characterize the different stages of learning. Differences in effort have as accompaniment differences in the quality of attention the learner gives to his tasks. In some cases, he pays attention because of external requirement only; in others, he pays attention to values that inhere in and derive from the activity that engages him.

In the preparation of a lesson by the memorization method, the student seeks information, repeats it, reads its description over and over, and sometimes uses other devices in order to have ready answers to the questions his teacher is apt to ask. He may give much attention to the information he is trying to acquire. Yet his attention may not get away from the external requirement which his teacher imposes. He may give but little attention to the intrinsic meaning of the information. For him the information has no value in and of itself. It is valuable only as a kind of medium of exchange for the teacher's approval.

We may now observe the attention and interest of the student who by his own unguided efforts or through the stimulus of his teacher begins to relate the various items of information he is engaged in acquiring. As he puts them together, he notes that some are similar and some are different. He develops inferences and draws conclusions and gets new meanings. He turns attention away from external requirements to what the various items of information seem to signify. He gains a new interest. Now he turns his attention to meaning which inheres in the information itself. Now his interest is a meaning which is quite apart from the trading value of the information. The externals may remain, but there develops an internal attraction which hitherto has not existed. Learning at this point is on a new and higher plane. It is no longer on the level where extrinsic interest prevails.

Differences in attitude characterize the different stages of learning. In the types of learning activities which concentrate upon intrinsic meanings, we may observe a high degree of personal attitude on the part of the student. What he learns seems more a personal acquisition and a personal possession. The meaning he gains as an inherent quality of the content of his studies is his meaning; the conclusions he develops are his conclusions; the ideas which result are his ideas. In his earlier learning, he followed where the content of his lesson led him. Now he is the leader of his thinking. He seeks content; he gives attention to content; he organizes content and points it up in the direction which his thinking determines. Now he relies more and more upon his own thinking, upon his own developing ability to understand.

We may observe the contrast in attitude among students in every subject. When the student reaches the point where he can set up an experiment in the laboratory, he has a resulting satisfaction which is not present at the earlier stages of his work when he had to follow the experimental procedure the teacher had demonstrated. When the student learns to read and interpret a poem for himself, he gains a more impressive meaning than was possible when he had to rely upon the interpretation of the teacher. When the student works an "original" in geometry, his solution gives a thrill of pride which is wholly incomprehensible to the student who can understand only what his teacher explains. When the primary pupil discovers that the words on the page of his primer "say something" to him, he finds a new delight in reading which transcends the pleasure he has had in the activities of his reading lessons to this point. When the primary pupil works out for himself the answer to a question of simple addition or simple division, he experiences a feeling of confidence in his ability which sometimes is a more important result than the answer he found.

Learning at the later stages depends upon learning at the earlier stages. The higher levels of learning are not reached at a single bound. They are not brought down to the student. They are not attained except from the necessary preliminary steps from the lower levels. The student moves up to the later steps after he has taken the earlier steps.

Earlier discussions have amply illustrated the point of our statement. Every observation we make of the work of pupils in school confirms its truth. The pupil can use reading to gain information for himself only after he has learned to read. He can draw a purpose for assimilative reading out of information, or he can organize information to lead to a conclusion, only after he has gained information. He can apply to practical situations the general ideas of arithmetic only after he has developed and matured the ideas. He can gain an understanding of the general laws of combination of quantities in algebra only after he has learned the particulars of the combination of quantities in arithmetic. Whatever the learning, use must wait upon acquisition.

Learning at the later stages does not necessarily follow learning at the earlier stages. While learning on the lower levels makes possible progression to the higher levels, it does not guarantee such progression. The learning of many students remains at the stage where it began. The learning of many students often fails to move ahead to the point where they can understand or appreciate or apply or infer or prove. Many students develop skills, but do not acquire ideas about their intelligent use. Many read to believe, but not to weigh and consider. Many gain meanings, but do not relate them. Many learn from direct experiences, but do not combine the things they learn to create important indirect experiences. Many gain knowledge, but draw from it no consistent inferences. Many accept beliefs, but cannot test them for truth or falsity.

Failure to progress to the higher stages of learning is not confined to pupils in the primary grades. Students in high school and college seem equally at fault. The pupil has trouble with his words and phrases. The student cannot read his sentences and paragraphs. The pupil does not recognize the key words and sentences in paragraphs. The student fails to bring the meanings of paragraphs into a unity. Progress through the school does not necessarily signify progress toward maturity in mental activity.

Learning at the later stages is of a different order. The reason why learning which must begin at a lower level of intellectual activity tends to remain there is that the process on the higher levels is of a quite different order. For example, putting together two items of information is not the same mental procedure, either in respect to the learner's purpose or in respect to his attitude, as is the process of acquiring the separate items. To put the items together, the one who learns must first have acquired them, and the processes differ. Practice in acquiring by no means prepares for practice in determining relations. Again, the relating of two experiences into an idea of relationship is not the same experience as the two original experiences which become fitted together. The original experiences may have come from actual contact with the environment. Their origins and their stimulations are objective. The experiences have a contact with objective reality. Putting the two experiences together, on the other hand, has quite a different source for its stimulation. Its stimulation comes from within. Its result, in an idea of relationship, is subjective. Its origin also is subjective. It is a type of experience which contact with objective reality does not of itself supply. Contact with objective reality is but a necessary preliminary. Withdrawal from objective reality and an accompanying attending to inner meanings give the new and different type of experience.

Summary. Education is in reality the cultivation of the higher mental processes. All the learning activities which it sets up must point in this direction. Learning at its start is of a low order. The course of its progress is away from the lower levels and toward those of a higher and different order.

The suggestions of earlier discussions relative to the moving of learning from lower to higher levels have come to a head under the following topical statements:

1. Differences in learning are familiar outcomes of schoolwork.
2. Differences in learning activities are frequently neglected.
3. Differences in effort characterize the different stages of learning.
4. Differences in quality of attention characterize the different stages of learning.
5. Differences in attitude characterize the different stages of learning.
6. Learning at the later stages depends upon learning at the earlier stages.
7. Learning at the later stages does not necessarily follow learning at the earlier stages.
8. Learning at the later stages is of a different order.

Chapter 24

Standards of Conduct

Purpose of the chapter. The behavior of the individual in society is under the influence of standards of conduct. These standards are at first the standards of the group into which he is born; later, they may be in part personal standards which substitute in greater or less degree for the standards of the group. The individual is unaware at first of the existence of standards; he comes under their influence indirectly because his social group compels his behavior to conform with their demands. Later, he becomes aware of the standards which are back of social requirements and social expectations. Still later, he adopts as his own the standards of the group, in whole or in part. All the while, standards control his behavior, first, through external compulsion, and later, through compulsion which comes from within. He thus may move from a state of dependence to one of independence.

The recognition of a standard represents the highest level of learning. The development of a personal standard represents the highest type of behavior. The individual who possesses high ideals—rather, the individual who has high ideals which possess him—has strong character. He has personality and stands out as a person. His personal standards individualize and personalize his conduct. Though he may not control others, he is a master of self-control. He represents the product of training and education which the good school sets up as the ideal toward which it seeks to lead its pupils and by which it measures its success.

What is character? How may we develop character? These are fundamental questions which the intelligent teacher must seek to answer. It is the purpose of the chapter to call these questions to attention.

The school seeks to develop character. Education is in essence character development. All the pupil learns enters his make-up as a person and contributes to his development. All he learns in some degree renders him a different individual, with a different internal quality, with a different outlook on the world, and with a different way of responding to external influences.

Our discussions to this point have indicated some of the specific influences the school brings to bear upon the developing pupil which make him a changed and changing individual. They have described his responses as he learns to perform the skills and make the distinctions that inhere in the basic arts, as he develops more effective and precise ways of thinking, as he broadens his experience through the acquisition of organized bodies of knowledge, as he gains appreciations of artistic productions—in short, as he becomes an educated person. Our discussions here and there have done more. They have shown how the acquisition of better ways of responding to the instruction of the school produces changes in attitudes and feelings. They have shown how the achieving pupil takes pride in his achievement as he learns to depend upon his growing knowledge and understanding.

We now turn to a consideration of some of the elements of good character and how they derive from the organization and management of the good school. This organization and this management are not provided for their own sake—that is, merely to have in operation a set of formalities. They are, rather, the formal means to much more important ends—namely, the learning results all our earlier discussions have sought to impress. In consequence, they are under the control of the learning results the school seeks. Under such control, the formalities keep within proper bounds, relaxing their control of the pupil's behavior as he learns to depend upon himself. They thus avoid the production of the repressions and frustrations which follow authority for its own sake.

Intelligence and feeling are marks of character. What a person knows and the way he feels are closely related, both to each other and to the way he decides and acts. Though his character rises above knowledge and sentiment, they help to distinguish it. The person of character knows right from wrong. He so sharply distinguishes the right as to give it a special respect. The person of character knows the rights of others. His regard for them gives him a sense of obligation. If another tells him, "This is right. That is wrong," he considers the advice, yet makes his own decision. He has respect for another's wisdom that is superior to his own, but retains the privilege and duty of making up his own mind. His intelligence gives his character stability; the way he feels gives it drive.

We may observe the interplay of intelligence and feeling in the conduct and attitude of the good citizen. The good citizen is intelligent and has a sense of personal obligation. He can distinguish good social policies from bad and at the same time determine what he should do about them. The weight of government is on his shoulders and he wishes to bear his share of the weight. He thinks more of himself as the support of the government, and less of the government as his means of support. He is more concerned with what he can contribute to the social good, and less with what he can get from society. He thinks, first, of what is right and, second, of his rights. He does not forget his duties while he takes advantage of his privileges. In short, the good citizen knows what exalts a nation and is concerned with exalting it.

The good citizen we have been considering may exist for us only as an ideal. We may examine our own qualities of citizenship only to discover that they fall short of the ideal. We may discover that we are not intelligent as is the good citizen and not unselfishly concerned about our responsibilities as is the good citizen. And we may know of no single individual who is entirely the ideal. Yet the fact that the ideal exists in the minds of good teachers is a hopeful and significant sign. They in their weakness may not reach the ideal, and in their inability may not help their pupils to reach it. Yet the ideal gives direction to their efforts; it is before them as the goal toward which they endeavor to lead their pupils.

Conduct indicates character. Conduct bespeaks the character of a person. His conduct helps build his character and is its outward expression. His character is the internal principle of consistency which determines what his conduct shall be. Conduct is part of the person's total reaction to a situation. If he discriminates keenly and surely what is right and the rights he must respect, he has at the same time a definite feeling or attitude. He conducts himself as he thinks and feels.

In the course of experience, the individual learns systematic and effective ways of making these discriminations. He develops out of particular judgments the judgments that have general application. He develops general attitudes toward situations which fall into a given class. He develops a pattern of arrangement into which he fits the situations he meets. Simultaneously, he modifies his conduct in terms of his growing general pattern of discrimination and attitude. He thus develops a tendency toward a general mode of reaction which has an internal consistency. This is the pattern of his conduct, his standard for judging what his conduct shall be in specific instances.

Specific acts of conduct, which may develop into certain habits of conduct, contribute to the growth of character. Yet character rises above habits. It is more than a mere integration of habits. It sometimes happens that a person's principle of consistent behavior, his standard or pattern, reaches a stage of development at which certain habits become inconsistent. At any such point, the person endeavors to break his offending habits, and if his character is strong enough, he does break them. The person of character integrates his conduct, including his habits, in accordance with his personal standard or personal principle of consistency. To the observer his actions may sometimes seem inconsistent and unintegrated. They seem so because the observer judges them by his standards, not by the standards of the one he observes. A test of character often is the persistence of the individual to act according to his own standards in the face of the violent opposition which may result from the inconsistency of his acts with the standards of his associates.

Discipline is a mark of character. The man of character is under control. He hews to the line. He is not swerved from his course by external influences. His conduct does not result from his whims or the importunities of others. His conduct is managed conduct.

The self-discipline of the person strong in character was first a discipline outside of self which finally became his own. An illustration is the way the discipline of the school develops a method of thinking. Near the beginning of the pupil's work in arithmetic, he must think of groups in terms of the group of ten, to regroup them into tens, to speak of them and to write of them as tens. Slowly the pupil develops the idea of ten and the idea becomes *his* idea. Finally, he of his own volition translates the groups with which he has to deal into tens. Thus, the type of number thinking which the school imposes upon him finally becomes his own, and the number thinking he finally does is his own thinking.

Another illustration is the learning by precept and example of some of the social graces by the child in the home. When the visitor comes, the mother directs the child to say, "Good morning," and if the visitor brings a gift, to say, "Thank you." The child expresses the required words of greeting and of thanks, and repeats them again and again in similar circumstances. What is more, the child observes the mother, other members of the household, and other persons exhibiting the same and similar good manners. As a result saying "Good morning" and "Thank you" gets to be more than mere habit of response. It becomes, in consciousness and feeling, a fitting part of the occasions requiring it. Henceforth, the child says "Good morning" and "Thank you" of his own volition.

The lessons of the home in good manners continue in the school. As a pupil, the child must take his turn, he must not shout, he must not interrupt, he must show kindness to others. All the while, he observes his teacher speaking and acting courteously and kindly. His actions must fit the pattern the teacher sets, and he quickly takes note of their fitness. His actions gradually come under the control of his growing idea of fitness.

In a similar manner, the external control of conduct may lead the individual into the habitual performance of a given pattern. Though it is at first an imposed pattern, he gradually makes it his own. In this way it comes about that what at first is an external discipline changes later into an internal discipline. In either case, it is the self that is under control.

The possession of ideals is a mark of character. The controls of a person's conduct exemplify the kind of character he has. His character does not require that someone must tell him what is right, that someone must persuade him to choose the right, or that someone must force him to do the right. Character shows in personal choice and action that are free from external influences, free in the sense that thought and deed are in advance of external influences, and sometimes at variance with external influences. Character shows in the possession of personal standards of conduct which shape and control it.

One's personal standards of conduct are his ideals. Ideals are controlling forces. As such, they are different from those ideals which are ends or goals. The former are the regulative ideals, and the latter are the terminal ideals. In respect to a given course of action, the two may coincide or they may be widely separated. Thus, one's ideal may measure up to what he knows and recognizes as the ideal, or it may fall far short of the ideal. For example, two students may be equally aware of what is the appropriate conduct in an examination, yet possess markedly different ideals of honesty which make their conduct markedly different. The ideal of the one student may be so rigid as not to permit him to countenance cheating in any form. It may remove the temptation to cheat even under the most favorable opportunity. The ideal of the other student may be so little developed as to permit cheating when a favorable opportunity affords.

The person of character is one who possesses ideals. Ideals, when possessed in full development, are such controlling forces that it may be more correct to say that they possess the person of character.

Conduct shapes according to its standards. Standards are the controls of conduct. In the case of the well-trained individual, the standards are his personal standards. In the case of the individual whose character is as yet undeveloped, the standards are those of the group in which he lives. The process of education may provide the substitution of personal standards for group standards.

The standards of the group into which a person is born surround him from birth. They are imposed upon him by those who are responsible for his training and education. He may rebel against them, ignore them at times, or violate them; yet the course of his education is in the direction of bringing him into conformity with them.

Honesty is a group standard. In one sense, honesty is an abstraction which stands out as the result of attending to a number of acts of honesty. As such, it is a kind of generalization which derives from and applies to all honest actions. In another sense, honesty is more than a generalization. It is a product of racial experience. Through long generations society has learned that it can get along to best advantage only through the cooperative honesty of its members. Society expects its members to be honest. It builds its economic and social and political life upon the expectation that its members will preserve the distinction between mine and thine and will give a full measure of service to society in return for the privileges society confers upon them.

Honesty is more than a generalization, for it varies among different groups and its influence changes with circumstances. The honest student may cheat in examinations in one classroom without being dishonest according to the standards of his group, and in another classroom he may have no inclination to cheat because cheating appears to be an overt act of dishonesty. The act of cheating does not differ; it is the standards which evaluate the act that differ. In the one case, the social atmosphere has so many crosscurrents that to cheat and "get away with it" is a challenge. The conduct of an examination has degenerated into a low form of game between teacher and students in which the teacher watches the students in the expectation that he may catch someone, and the students watch the teacher surreptitiously in order to balk his efforts. In the other case, the social standard is wholly different. Everyone expects everyone to act honestly. The teacher expects honesty, and through the teacher's influence all the students expect it. Cheating is reprehensible, because it violates the standard of the group. The otherwise dishonest student may not be inclined to cheat. The social atmosphere makes any suggestion of cheating, or of taking undue advantage, seem wholly inappropriate.

The student who has a high personal standard of honesty acts honestly under all circumstances. Even in the classroom where the examination seems to be a contest between teacher and students, he refrains from cheating. This is not to say that he has lost his human characteristics or his sense of humor. He may see the fun and condone the fun of some of his classmates in fooling the teacher; yet his personal standard does not permit him to indulge.

His conduct rises above the standard of the group, because it is under the control of his ideal.

There are many illustrations of the force of standards, both group standards and personal standards, in the shaping of conduct. We can call to mind certain persons in the business life of our community who are honest—that is, not dishonest—because they have a certain reputation to maintain. The price of being found out is too much for them to pay. And we can recall many other persons in the business life of our community who are scrupulously honest, because honesty is an ideal which controls their actions. These are persons of character, not merely of good reputation.

Ideals are not taught. Ideals are achievements of the individual who possesses them, not qualities which come to him through direct transference. In their development ideals are much the same as ideas. Ideals are not directly taught, and they are not gifts of another. They grow within. They are the product of responses, of feelings, and of thinking. Yet in their development the teacher can be an indirect agent. He can set up the external influences which impel the pupil to carry on the mental activities and the responses that build the ideals.

An important corollary is that the teacher must be sure that the pupil respects and meets the requirements of the program of the school. In his school, let us say, the teacher fosters a standard of honest work. He selects the tasks that are within the pupil's ability to perform, and requires the pupil to perform them to the best of his ability, for he considers as honest work for a pupil the best the pupil can do. The teacher makes this type of work the standard, and subjects the pupil to what the standard requires. The teacher conducts no course in honesty; he assigns no lessons in honesty; he does not teach honesty. He requires honest work in arithmetic, honest work in reading, honest work in writing, history, algebra, literature, and science. The good school has no special program for honesty; it maintains the requirement of honesty all day long in its every activity.

The teacher impresses other standards by requiring such conformity as the developing pupil is able to make. The pupil must be punctual; he must be truthful; he must perform his tasks with regularity; he must be industrious. The extent of the teacher's success in impressing the standards corresponds to the degree of adjustment he can require.

Adaptation leads to habits, insights, and feelings. The way the pupil learns to be punctual illustrates the effect of external requirement. The pupil is not instinctively punctual, and he does not grow naturally into punctuality. He does not become punctual merely through the opportunity of being punctual if he chooses. Someone has to require him to be punctual if he ever learns the lessons of punctuality. That is to say, someone, at the outset, must assume responsibility for the pupil. His parents send him to school on time. When he gets to school, he encounters a program of work that begins on time and ends on time. Work periods, play periods, study periods and rest periods begin and end on time. Everything comes and goes according to schedule, and the pupil must adjust to get along. The good school assumes its responsibility and requires the pupil to make adjustments. As a result, the pupil slowly develops the habit of doing things punctually. As his habit forms, he develops an insight into the significance of punctuality and a feeling that he should do things on time. In this way punctuality enters into his conduct, his understanding, and his attitude. In this way what was once a group standard becomes his personal standard. In this way social expectation turns into individual expectation. Henceforth, the pupil expects to do things on time and he expects the same of others. His performance and expectation influence others and add to the general expectation of punctual behavior.

Ideals develop from adaptation. An ideal is a combination of conduct, understanding, and attitude. The ideal begins in adjustment to external pressures and becomes a control that is from within. The development of an ideal is a movement of the individual from group influence to self-control, from dependence to independence, from discipline to freedom, from adaptation to cooperative activity. The final product takes its quality from the kind of requirement that was over the individual from the beginning. His habit of punctuality, his understanding of its significance, and his attitude toward it depend upon the way he has had to meet the external requirements and adjust his behavior to them.

As the ideal of punctuality develops, so do other ideals, or personal standards of conduct—honesty, industry, and so on. First, the individual must adapt to the pressure of social standards imposed from without; next, if he adapts long enough and faithfully enough, he acquires the habit of adapting, an understanding of the need for adapting, and the feeling of rightness of adapting, which constitute his ideal that governs from within. There is a serial order to the two steps of progress which he must not ignore.

The serial order of the two steps of progress appears in the various stages and kinds of effectual learning. The primitive youth who became so skilled in archery as to be able to cooperate with his tribe in hunting and warfare had first to adjust his muscular tensions to the size and style of the bow with which he learned to shoot. The modern scientist who engages in the pursuit of truth had first to shape his thinking to the science which his predecessors had developed. The artist who can charm the ear or the eye had first to give respect to the discipline of his art. The pupil who can read well enough to make reading a means of pleasure and instruction had first to guide and hold his attention to the demands of the printed page. The citizen who can cooperate with his fellows to further the social welfare had first to adapt to social customs and social demands. External management is the first step, and self-management is the final step. In each instance the character of the self-control takes its pattern from the character of the original influence from without. The responsibility of the teacher and the school is thus most impressively affirmed.

Insight and feeling are components of ideals. A person's habit of action, his habitual conduct, is an important component of his ideals. Without habit there can be no ideal, yet habit alone does not constitute the ideal. Habit of itself is blind; it fits only a set pattern of circumstances. When conditions change, or when temptation to depart from habitual performance is great enough, habit of itself does not solve the situation. To illustrate, the habit of scrupulous honesty seems wholly unrelated to the act of the defaulting cashier. For long years he has acted honestly. The act of striking a daily balance has become habitual. The distinctions of personal obligation and of property rights have become second nature. Yet suddenly the bonds of his habits break, and he leaves with the cash reserves. Habit was not a sufficient bolster against unusual and overpowering temptation.

Working with this individual have been many lesser employees whose habits were less well developed, yet they succumbed to no such temptation. To most or to all of them, no such temptation existed. Though they possessed less of habit, they possessed more of other needed qualities than did the defaulting cashier.

Mention of other needed qualities has appeared in earlier topics. The needed qualities are those of insight and feeling. To become an ideal, controlling action in an intelligent and all-powerful way, habit must have the stimulus of desire. The feeling that accompanies insight must guide and control it.

Feeling and insight are sometimes stimulated by the directions and admonitions other persons give and by the mottoes, codes, and slogans other persons suggest, provided that appropriate conduct accompany these. In the training of boys the slogan "Be trustworthy" seems helpful only when the boys are having considerable practice in trustworthy behavior. Language is only one element in the training. Behavior is the chief element, leading to habit, and providing the content of insight and feeling. Language is merely a guide to the significance of behavior.

Summary. Character in the individual is the possession of ideals which control his conduct. To gain them, he has to conform to group standards. In the course of time, through the practice of conformity, he develops habits of conduct and with them recognition of the group standards and more or less favorable attitudes toward them. Conduct and insight and feeling, as they grow, unite to make his personal standards, his ideals. At their beginning, his ideals are not full grown; they are far below the standards of the group which command him. Slowly his ideals may grow, up and up until they are on a level with the group standards. At this point, the individual achieves the freedom which a person of character possesses. No longer are group standards the controls of his conduct. His conduct remains on a high level even when group standards are withdrawn and he is on his own. And if he should be one of the rare individuals of his generation, his ideals continue to develop until they rise above group standards, and he becomes one of the few who help to pull the group standards to a higher level.

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